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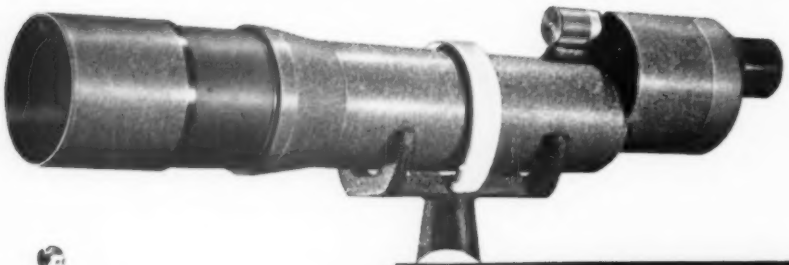

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Letters

Hummers and Persimmons

I have a persimmon tree outside my study window on which is fruit in all stages of ripeness. I saw hummingbirds (or maybe just the same one) on several occasions flying to the ripened fruit, spearing it with their long beaks and staying there a long time sucking the juice.

I thought they were only attracted to flower nectar.

MRS. MAY DONOVAN

San Jose, California

Editors' Note: *According to scientific studies of the food habits of hummingbirds, several species feed largely on insects. One food habits investigator believed that insects in certain flowers are the major attraction for some hummingbirds, although these birds are fond of nectar, too. Robert S. Woods, who has studied hummingbirds for many years, says that in California, the Anna's hummingbird usually feeds on the nectar of flowers, and more rarely on fruit juices and the sap of trees. He once saw an Anna's hummingbird, in fall, sipping the juice of a persimmon that had been pecked open by other birds.*

Crow Eats Rat

Mrs. Steinhardt's letter about the Cooper's hawk and the rat in the May-June 1952 issue of *Audubon Magazine* reminds me of once seeing a crow perched in a tree and making strange-looking motions. As I approached the crow flew away, dropping the half eaten carcass of a large rat.

JOHN R. ELDRED

Kingston, Rhode Island

Martins on the West Coast

I have the problem of acquiring insects in large numbers to feed purple martins which I will raise by hand-feeding this summer.

This is the fifth year I have been working on a project to "domesticate" Oregon's martins. As you no doubt know, these birds do not use man-erected nesting sites this side of the Rockies. The bird lovers of the West Coast (many of us transplanted southerners and easterners) are being deprived of a beautiful, useful and tuneful bird because the purple martin has not yet learned to nest in martin houses in the West. It is high time that these birds be brought out

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of the wilds since the lumber companies are instituting a fire prevention program one step of which is the knocking down of the tall dead snags which apparently furnish more than 90 per cent of the nesting sites of this bird in the West. Also heavy use of DDT to fight the spruce budworm is being carried out.

At present I am "sweating out" the return of the three martins I raised last year and making plans for domesticating more this summer.

STANLEY M. RICHMOND

Eugene, Oregon

Editors' Note: *There are several records of the western martin,* Progne subis hesperia, *nesting in houses put up for them. In Loyalton, Sierra County, California, Joseph Mailliard* (The Condor, *Vol. 21, March, 1919, p. 76) saw a colony of western martins occupying "an old-fashioned martin box on a pole in the street." Roland Case Ross* (The Condor, *Vol. 27, September, 1925, p. 209) *tells of a man in Sierra County who had a colony of western martins nesting in a bird box on the roof of his ranch barn where they returned for years.*

Has any of our readers ever heard of purple martins nesting in bird boxes along the West Coast? We shall be glad to forward such information to Dr. Richmond who would like to correspond with others interested in getting martins to accept birdhouses in the Far West.

Cemeteries As Sanctuaries

For some years I have had the idea of utilizing cemeteries as bird sanctuaries. It is my belief that if the plan is initiated at National Cemeteries, communities will adopt it. Furthermore, the plan could be extended to all military posts, stations and reservations.

I am of the opinion that many people would, instead of sending flowers to funerals, send funds for the purchase of feed, birdhouses and baths, shrubbery, trees, etc., and thus the project would become self-sustaining.

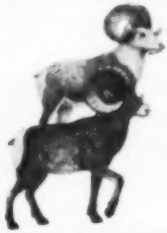
I have spoken to some members of the Los Angeles and San Diego Audubon Societies about this plan and they are enthusiastic about it.

F. J. OSTERMANN
LT. COLONEL, U. S. A., RETIRED

San Diego, California

Grouse in Duluth

In the March-April, 1952 issue of *Audubon Magazine* the article titled, *"Wild Birds in the City,"* by Varian Fry, reminded me of an inci-



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dent which occurred in October, 1950, in Duluth, Minnesota.

I had parked my car in the heart of the city, near the Post Office. A man, much excited, rushed up to me, waving his arms wildly. I had never seen him before. He was an enthusiastic bird lover and was calling my attention to a ruffed grouse that was perched on the cornice of the Post Office building, in the company of a flock of pigeons. Apparently, this bird had come to the city in order to seek safety from hunters and was learning his way about from those city slickers, the pigeons.

Later, I heard that the bird—which we New Englanders have misnamed "partridge," had flown into the open window of a downtown school to the delight of the children and the dismay of the teacher. The bird stayed around in the city all through the hunting season. I do not know whether he ended up in an oven or eventually got back to his native woods.

CORNELIUS A. WOOD

Andover, Massachusetts

Editors' Note: Duluth, with its face to the Great Lakes and its back to the North Woods, is accustomed to visitors from the wild. Natives tell tales about wolves in the outskirts and bears sauntering down the main street. Not all Duluthians are sympathetic toward wildlife, however, and many of these daring mammals are killed before they get much of a taste of civilization.

BIRD SONGS ON NBC NETWORK

"Songs of the Wild" is the title of a weekly radio program being presented by the National Audubon Society over the NBC network. It is on the air every Sunday from 11:45 a.m. to 12 noon, Eastern Daylight Time, through September 28.

This series of programs, which is being presented jointly by the NBC Education Department and the Public Information Department of the Society, is based on the famous Cornell recordings of bird songs. The commentaries are being handled by Rea King of the Society's staff. It is suggested that members check with their nearest NBC station to determine whether the series is being carried locally and at what time it can be heard.

Announcing a new feature by *Roger Tory Peterson*

The editors of *Audubon Magazine* are pleased to report that starting in the September-October issue a regular feature titled *"Roger Peterson's Bird's-Eye View"* will appear in each number of the magazine.

It will be an informal column in which Mr. Peterson, who is widely regarded as America's leading popularizer of birds, will tell of his experiences during his travels, and share with us his ideas and opinions on a variety of subjects. The feature will be illustrated with some of Mr. Peterson's sketches, which will be made especially for *Audubon Magazine*. The first of his articles will be titled *"A Night in a Channel Lighthouse."* It describes a thrilling night of bird observation on the English coast.

Roger Peterson has been in England and on the continent since late February, putting the finishing touches on his "Field Guide to the Birds of Britain and Europe." He returned briefly in May to receive an honorary degree of Doctor of Sciences from Franklin and Marshall College in Lancaster, Pennsylvania. He went back to England early in July.

Look for *"Roger Peterson's Bird's-Eye View"* in the September-October issue—and tell your friends about it.

Roger T. Peterson (right) receives an honorary degree of Doctor of Sciences from Dr. Paul Kieffer of Franklin and Marshall College.

AUDUBON CONVENTION IN NOVEMBER

The 48th annual convention of the National Audubon Society and its branch and affiliated organizations will take place November 15-18 in New York City, with Audubon House as headquarters.

The annual dinner will take place the evening of November 18 and will be the concluding event of the convention. Full details of the program will be mailed to all members. Members are urged to plan now to be present at the convention.

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RICHARD H. POUGH

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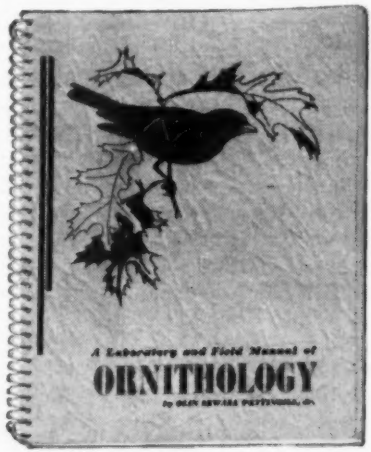

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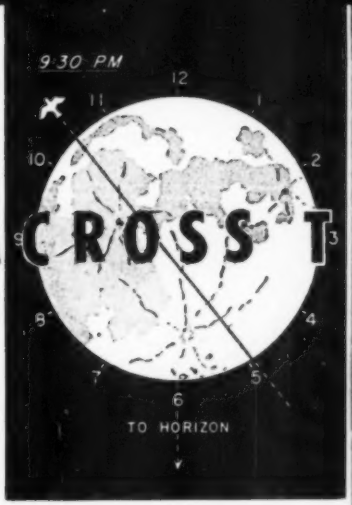


By Robert J. Newman*

"BIRD!"

The voice coming out of the semi-darkness, had a lilt in it. It was as though a bird, *any* bird—not the first purple martin of spring necessarily, nor the last surviving ivory-billed woodpecker, nor a newly discovered subspecies, but just any bird at all—was a momentous matter. The voice continued:

"Eleven-thirty to five! Definition beautiful! About two T."

A flashlight winked on. Another voice inquired, "Remarks?"

"Well, pretty fast, I'd say, but straight as an arrow."

Since 1946, this bewildering bit of dialogue, with minor variations, has been repeated more than 10,000 times. It has been heard on half-a-dozen college campuses; aboard a destroyer cruising the Gulf of Mexico; beneath the domes of astronomical observatories; at the fringe of tropical jungles; on the remote sandspits of the Dry Tortugas, and in plain backyards in the heart of great cities. But, varied as these settings have been, they have all had one thing in common. They have all been bathed in the pale light of the moon.

To understand what all this is about, we must go back to a spring six years ago

* Mr. Newman is assistant curator of the Museum of Zoology at Louisiana State University. A detailed account of the studies described in this article was published in 1951 by the Museum of Natural History at the University of Kansas under the title, *A Quantitative Study of the Nocturnal Migration of Birds*, by George H. Lowery, Jr.

"Bird!" is the call that the observer at the telescope uses to alert the recorder beside him.

Counting flight silhouettes is a challenging night-time project for bird watchers this autumn; it will add to scientific knowledge about migrations.

HE MOON

when George H. Lowery, Jr., curator of the Louisiana State University Museum of Zoology, was trying to find out whether any of the birds returning from Central America fly directly across the Gulf of Mexico or whether they all detour around it. What was needed was a means of measuring the amount of migration taking place at different times and places and in different directions. What is more, it had to be a method that would work at night, when most trans-Gulf flights were supposed to take place. Immediately, when you hear of this problem, you probably think of radar. So did Lowery. Radar had already on occasion detected the passage of large birds like geese. Unfortunately, so the electronics experts said, a device sensitive enough to do the same thing with small land birds would take hundreds of thousands of dollars, and a long time, to develop.

Then Lowery remembered several papers published around the turn of the century, describing the flight of migrating birds before the disc of the moon as seen through a telescope. Could these silhouettes be used somehow to obtain the information he was seeking? Lowery took the question to his friend, Professor W. A. Rense of the Department of Physics and Astronomy at Louisiana State. Rense's answer was yes, but not a simple, unqualified yes; it was an answer complicated with sines, cosines, and spherical triangles, with zeniths and azimuths, and with Greek letters like theta, eta and alpha.

Leaving these matters to the mathematicians, let us merely note what Rense eventually accomplished. The space in which one sees birds through a telescope pointed at the moon is constantly changing in size because of the movement of the moon. Rense devised equations that make adjustments for these changes. The equations permit one to use counts made with the telescope as samples to determine the probable number of birds per hour crossing over a one-mile line on the earth's surface. In order to carry out the computations, however, and to find out what the directional trend of the flight is, it is necessary to know the

Students of Louisiana State University, with a 20-power telescope, notebook and flashlight, cooperate in the study.

ORIGINAL DATA SHEET

DATE 24-25 April 1948 LOCALITY Progreso, Yucatan

OBSERVERS Harold Harry, George H. Lowery

WEATHER Moderate to strong "Norte" winds along coast, slightly Hazy. Moon-enveloped above low cloud bank at 8:00.

INSTRUMENT Bird Spotting Scope, image west

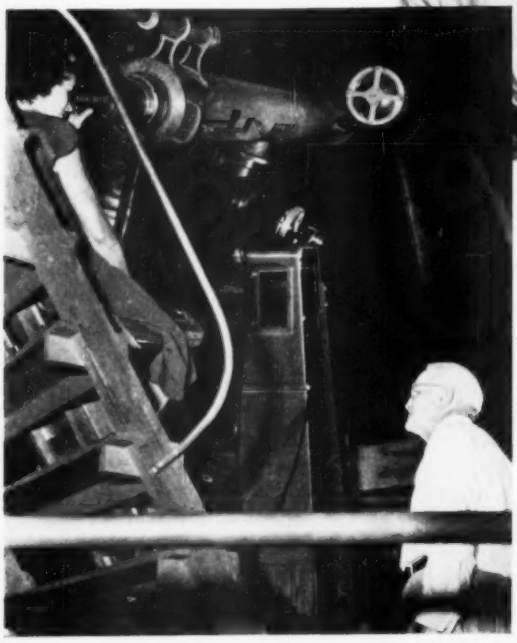
REMARKS Observation station located 1 mile from land, over gulf of Mexico, at end of new Progreso wharf

TIME	IN	OUT	REMARKS
CST			observations begun, H H Lowery
8 26	4 30	9	slow, small
50	3	10	medium size
56	2	10 30	very small
9 00	5	9 30	moderately f st
11	5	10	very small.
25	3	11	
26	5	10	medium si
36	3	10	
40	5 30	9	small
43	3 30	10	medium
48	4 30	10	Time out
56	—	—	Small
9 58-10 00	4 30	11 30	
10 05	3	11	very sm
06	5	8	very fe
12	5	12	Small
25	4	10	
30	4	11	
32	2	11	
32	5	11	
38	4	1	
43	5 10	11	SW

slant of each observed bird's pathway across the face of the moon. This information can be recorded by imagining that the moon is an upright clock with the rim marked off according to the 12 hours and with the midpoints between the hour marks considered as half-hours. Then the point on the rim where the bird appears and the point where it disappears can each be identified in terms of these hours, establishing its flight line.

George H. Lowery, Jr., curator of the Museum of Zoology, Louisiana State University, sets the azimuth on a mechanical device for converting to compass directions the readings on a sheet (left) of birds crossing the moon.

The author (left) plots points read to him by Lowery as they prepare a graph 10 feet long.



Many of the studies of bird migration at night have been made from astronomical observatories.

This is the key to the strange snatches of conversation that are now being heard on moonlit nights all over the North American continent. "Bird!" is the call that the observer at a telescope uses to alert the recorder sitting beside him, and "eleven-thirty to five" is the description of a bird's path as it glides across the bright white background of the moon and over the silvery areas called lunar seas. Along with this "clock reading" goes other terse information regarding the speed of the bird, the curvature of its path, and the clarity of its focus.

And what about two T? Well, that is a device to indicate the size of the bird's silhouette. Long ago the features of the moon received fanciful names, and some not so fanciful—names like the Lake of Death, the Hurricane Ocean, the Sea of Showers, the Alps and the Appenines—and these names have stuck. One of the most prominent of these features is the crater Tycho, which stands out on the moon's surface like the navel on an immense floodlit plaster model of an orange. Moon-watchers refer to its diameter as T and use it to measure the bird's apparent length. Two T, for example, indicates a bird whose image is twice as long as the diameter of Tycho.

Lowery eventually had the satisfaction of sitting out on the Gulf of Mexico, at the end of a wharf, a mile beyond the surf, and watching 86 birds flash across the moon in a single hour as they left the coast of Yucatan and headed out over 600 miles of open sea toward the northern Texas coast and the heel of Louisiana. The moon was high over the water so that he was looking through a mere sliver of the night sky; and the birds that he counted through his telescope were the equivalent of 11,900 birds crossing over one mile of the shoreline. That was on the night of April 23, 1948. By that time it had become apparent that flight studies by means of the moon were

The directions of bird flights are drawn on weather maps to study the relations of air currents to migration.

much more than a way of finding out whether any migrants cross the Gulf. They would permit us to peer into the very heart of age-old basic mysteries of mass migration.

It is necessary to pause a moment to grasp how revolutionary this development really is. Never before have we been able definitely to measure the volume of migration, even in daylight. When we go out on a May morning bird trip to look for migrant species, we can seldom tell for sure which is the process of migration itself and which are merely effects of migration. Five thousand birds interrupting their migration to flit about for an hour in search of food *within* a square mile of fields and woodland look to the observer much the same as 5,000 individuals moving *through* the same area and being replaced every 10 minutes by another 5,000. Yet the one case represents no migration, while the other means migration at the rate of 30,000 birds per mile per hour! This is only one of several reasons why the impressions gotten on a bird walk may be very misleading. All of the notions we have based in the past on such impressions may be correct, but there is a good chance that some of them are quite wrong. The moon and the telescope offer an opportunity to find out.

So, before he set out for Yucatan, Lowery had suggested that some observations be made in other places at the same time. It has been said that the bird enthusiasts of America tend to shy away from the scientific aspects of their subject, being in this respect unlike Europeans. However that may be, the response to Lowery's suggestion was gratifying. Telescopes were lifted toward the moon at 30 localities scattered over the continent. Before the season ended, more than 200 people had pooled their efforts to pile up more than 1,000 hours of observation.

From the resulting accumulation of data many surprising things were discovered. Some of them had to do with night migrational routes. It has been pretty generally supposed, for instance, that the peninsula of Florida is a major avenue of flight. Nevertheless, at Tampico, on the east coast of Mexico, almost as many birds were seen in a single *hour* as were seen over the Florida station, at Winter Park, on 11 *nights* of observation. Lunar studies have also indicated that, unlike birds in the daytime, nocturnal migrants rarely fly in definite flocks; that sometimes they fly *southward* in spring, and that they tend to ride the prevailing air currents toward their destination.

But more unexpected than any of these things, perhaps, has been the discovery relating to the basic hour-to-hour pattern of their nightly activity. Ornithologists used to suppose that nocturnal migrants either traveled all night long or that they usually confined their activity to the period directly after sunset or shortly before dawn. The moon has revealed that most of them follow none of these seemingly sensible courses. After sunset the majority of the migrants seem to rest a while. Then, hour by hour,

In 1948, from the Gulf of Mexico to the Great Lakes, observers watched migrating birds crossing the moon.

they mount in increasing numbers into the dark sky. This process typically reaches a peak between 11 p.m. and midnight. Thereafter the birds begin to drop to earth again until by the hour before dawn almost none are left a-wing.

Whatever way you look at it, it appears that many birds must get up in the middle of the night just for the sake of making three or four hours' progress toward their destinations. Why they do so we cannot guess as yet. However, it is interesting to note that the pattern of their activity corresponds closely to the pattern of migratory restlessness displayed in spring by wild European birds confined in cages with electrically wired perches that register their movements from one part of the cage to the other.

All of these results have been based on observations in spring, made mostly in the central and southern parts of the United States. We still need to know how they apply in the northern tier of states and in all the region west of the Great Plains. We still need to know whether they hold good *anywhere* in autumn. And we still need answers to a whole host of other questions. Does the moonlight itself affect the volume of migration? Do the "chip" notes of small land birds give any indication of the number passing overhead in the darkness? Do migrants funneled onto peninsulas double back? Do they advance in a wide movement, with a nearly even distribution of numbers along a broad front? Or do they travel in narrow streams? Are such streams channeled along rivers, valleys, mountain ranges and coastlines?

Finding the answers will require observations in tremendous quantity. Until recently the time needed to process that much data was a terrific obstacle to the full use of the telescopic method. For every hour that a moon observer spent behind the telescope in the spring of 1948, Lowery and his staff had to spend two man-hours working with slide-rules just to get the material ready for final analysis. Now, however, graphs and tables have been prepared that make it possible to handle observations in unlimited amounts.

A plan is underway to cover the country in the fall of 1952 with a network of telescopes operating simultaneously. That will require the help of interested persons everywhere. The observational procedure is a very simple one; it can be mastered in a few minutes. Anyone can participate—amateur bird watchers, professional ornithologists, or even people who know nothing of birds or bird study but would like to know. Perhaps someone else in your area is already planning to cooperate in the project. Call your local Audubon Society, bird club, observatory, or university zoology department to find out. If no one in your vicinity knows about the project, you may find out what to do by writing to the Museum of Zoology, Louisiana State University, Baton Rouge, La., for a mimeographed pamphlet, *Studying Nocturnal Bird Migration by Means of the Moon.* Almost any telescope of 19-power or more that will encompass the whole moon in its field can be used to study night migration. The spotting scopes popular among bird students are fine. If you have such an instrument but cannot find time to do any moon-watching yourself, perhaps you would like to lend it to someone else in your town who can. If so, notify the Museum of Zoology, and an attempt will be made to coordinate telescopes and observers.

A couple of years ago, there appeared in a national magazine a short story by a writer who had helped in the original investigation. You may recall it. It told of a professor who induced a backwoodsman in the Everglades to make telescopic observations of migration from a platform in the top of a tree. The latter was so inspired by what he saw that he thought he could fly too. The ensuing events brought a swift end to the story and to the woodsman as well. Prospective moon-watchers may feel reassured to learn that, while observation of the procession of migrants across the moon is indeed fascinating, it has never in real life resulted in a human fatality. The project does, however, offer to those who find pleasure in watching birds a challenging opportunity to contribute to the sum total of our knowledge about them.

A GLANCE BACKWARD

The dramatic recovery of the American egret and other southern herons is one of the great conservation achievements of our times.

American egret with young photographed by Allan D. Cruickshank.

ON June 14, 1952, Gardner D. Stout, Chairman of the Executive Committee and a director of the National Audubon Society, with his son, Prentice, and this editor, found several pairs of American egrets with young in their nests at Sandy Hook, New Jersey. As far as we know, this is the first time these birds have nested at Sandy Hook, which is now the most northern American egret rookery on the Atlantic Coast.

Mr. Stout, for many years an active field ornithologist in this area, had seen the egrets there previously among nesting great blue and black-crowned night herons, but had not found them breeding. We believe that the discovery of this new egret rookery merits a brief review of one of the most dramatic recoveries of a persecuted bird, or group of birds, in North America.

Within the United States, in the 19th century, the American egret nested from our southern states north to southern New Jersey, Illinois and Wisconsin. By 1900, plume hunters, working for the millinery trade, had devastated practically all egret rookeries in the United States, except a few remote colonies in the South where Audubon wardens were posted to guard the last of these birds. Within 15 years, protection of the rookeries, new state laws to preserve these birds, and public sympathy for them, aroused by the National Association of Audubon Societies (now the National Audubon Society) had their first noticeable effects.

In August, 1914, 12 American egrets suddenly appeared near Arlington, Virginia, where they remained for some time, and an observer near Bernardsville, in northern New Jersey, saw two during the same month. Two years later, three American egrets that arrived at Van Cortlandt Park in New York City in July and remained until August, caused Dr. Frank M. Chapman to comment:

". . . it is as surprising as it is pleasing to observe that under proper protection this beautiful bird may again become a part of our lives."*

In 1918, Congress passed the highly important Migratory Bird Treaty Act, giving federal protection to egrets, herons, and many other birds.

Gardner D. Stout photographed by John K. Terres.

Through the 1920's, both the American and snowy egrets appeared during late summer in Pennsylvania, New Jersey, and other northern states. Then, in 1928, American egrets nested in southern New Jersey, perhaps for the first time in 100 years. They returned in 1931 and again in 1933. A year later, Dr. Witmer Stone and Julian K. Potter reported that the colony had grown to 10 pairs. In 1935, little blue

Continued on Page 270

* *Bird-Lore*, September-October, 1917, page 251.

Many people study birds only, but our native mice, shrews, creatures are just as rewarding. A zoologist

All photographs by the author.

By William J. Hamilton, Jr.*

LET no one believe for a moment that all of the habits of our common mammals have been carefully cataloged. The city dweller could profitably study a house mouse, for this creature of the pantry is just as untamed and worthy of investigation as the lordly moose of the New Brunswick spruce forests or the great brown bears of Alaska.

Members of federal agencies concerned with wildlife, curators of museums, and members of the staffs of universities, which give instruction in natural history, are almost always willing to give counsel.

* For an account of the author and a previous mammal article by Dr. Hamilton, see *Audubon Magazine*, March-April, 1950 issue, pp. 96-101 and p. 134.

The life history of the gray squirrel has not been fully explored.

raccoons, and other four-footed

tells how any one of us can

make new discoveries about

Drawing of masked shrew by Earl L. Poole.

OUR LITTLE-KNOWN MAMMALS

What to Study

What to study? I consider the most difficult part of a research problem is not in its actual conduct, but rather in seeing the problems at hand. Equipped with a few dozen mouse traps, the veriest tyro can soon collect small mammals and thus learn which ones occur in his region. By taking a series of these animals alive in several traps designed for this purpose, a start can be made toward a real contribution to our knowledge of these creatures. The burrows and nest chambers of only a few small mammals have been uncovered and figured. Most of our western ground squirrels would repay close study. Probably no American naturalist has described the development of young moles from birth to the time they are independent of the natal chamber. If such has been done, it yet remains to be published. To me, the sight of a previously undescribed newborn young of a common mammal brings as great a thrill as the ornithologist realizes in discovering the nest and eggs of the rarest bird.

Migrations and Food Habits

Where do our migratory bats winter? The southern naturalists may give us the final clue to the January residence of the northern red and the hoary bat. Climb into the attic quarters of a colony of little brown bats during late June and observe parental care of the young. This may seem an unenviable chore, but surely a fruitful source of study.

Some years ago I examined more than a thousand stomachs of our small eastern

Although excellent studies have revealed considerable about the habits of white-footed mice, much remains to be learned.

mammals. I was amazed to learn that deer mice and many other little rodents are highly insectivorous, competing with the birds for destructive beetles and caterpillars that swarm in the forest. Red letter days were those in which I first set eyes on newborn woodchucks, pine mice, short-tailed shrews, weasels and others. It has been my good fortune to follow the development of these common animals until they were capable of producing their own young.

Trapping and Marking Mammals

The secretive habits of mammals, retiring dispositions and, often, nocturnal activities, account, in a measure, for our surprising lack of knowledge of some of our commonest mammals. Unlike birds, which are readily observed, the abundant native mice, moles, shrews, squirrels and larger species will repay careful study, for their mode of life has not been recorded in the detail of many other species which are more readily observed.

Many a young naturalist is discouraged from undertaking a study of a specific animal, for he feels that all too often any supposed "new" facts may already have been reported upon. This fruitless feeling may be allayed by turning the pages of any current scientific journal devoted to the mammals. Every issue will bear testimony to recent researches that have added new data on our everyday forms.

New types of traps, recent techniques in the marking of live animals for future identification, and the increasing ease of visiting supposedly "unexplored" areas have provided us added avenues for field and laboratory studies.

Marking mammals so that, when later recovered, the growth, pelage change, wanderings, breeding habits and the like under natural conditions can be faithfully recorded, is of growing interest to many biologists. Such procedure shows great promise and already has produced much exact data on the lives of our common forms.

Equipment Needed

For research on our abundant and commonplace creatures, there is no need for great sums of money or elaborate equipment to unravel their secrets. Only a keen eye, the enthusiasm for an interesting task and a relatively small amount of jars, chemical preservatives, traps and cages. Since only a brief survey is possible, I propose to deal primarily with our common species of mammals. One might write in the same vein of our salamanders, frogs, turtles, snakes and lizards.

Mammals are represented by several species and numerous individuals in nearly all habitats. Their secretive behavior may militate against a detailed study but the results of a planned and industrious investigation often pays the researcher rich dividends.

Unlike our birds, the mice, moles, shrews, bats and flesheaters seldom possess an esthetic appeal to most people. One may be surprised to learn that small mammals far outrank the birds in populations. Their economic significance to man is often much greater. Deer and rabbits provide the hunter with sport and food, while the beaver, raccoon, muskrat, mink, fox and weasel unwillingly contribute their pelts to the fur industry. Field mice, ground squirrels and other small species may ravage the crops and fruit trees of the agriculturist. Practically every species is of some economic significance, and must in time attract the attention of the hunter, trapper, agriculturist or field naturalist.

The Life Histories Outline

In any planned study of an animal, it is essential that the investigator equip himself with a good life history outline, in which is incorporated the various topics for investigation. Had the illustrious naturalists, Audubon and Bachman, used a topical outline when writing their monumental "Quadrupeds of North America," they surely would have added pertinent facts which were known to them but surely overlooked in assembling the manuscript.

Major headings might well include a historical sketch and description of the species, together with measurements, weights, and factors determining the present distribution of the creature. It is desirable to figure and describe tracks, feces, claw marks, wallows,

The habits of pocket gophers, which made these mounds of soil in a Georgia pasture, need to be studied in the Southeast.

Ground squirrels (mantled ground squirrel in photograph) and chipmunks of our western states, which can be approached closely, make admirable subjects for study.

forms, nests, shelters, trails and the like. Habitat relationships should include the animal's relation to soil, rocks, water and the effect of unusual climatic conditions upon it, as storms, floods and the degree of its rapidity of recovery from these disasters. The interrelationship of different kinds of animals is a fascinating topic. Its friends and enemies at various ages, and the methods that its enemies use to capture it, should be recorded. Its parasites, disease germs, and the adaptations of animals to each other and to plants and competition between closely related species might well be included in this category.

Specific Study Suggestions

The time of activity, both daily and seasonal, migration, dates of appearance, as of hibernating species, causes of periodic movements and kindred subjects are of great importance in a life history survey. The reasons for the hibernation of certain mammals, and the completeness or incompleteness of torpidity is little known for most species.

Voice and other means of communication, as warning attitudes, or the emission of glandular secretions, odor posts and the role of sight and smell have been studied for only a few common mammals.

An understanding of the eating and drinking habits, seasonal dietary, the storage of food, the dependence upon water and associated phenomena, are worthy fields for exploration.

The breeding habits of mammals are often difficult to observe. Courting antics, relations of the sexes in general, the gestation lengths, dates of birth and numbers of litters and of young, the social life of the family and allied topics can often be observed either in the wild or with captive individuals. These studies should include descriptions and figures of the nests, shelters and obvious places of resort, the home range and territory occupied by the species and other behavior phenomena concerned with the perpetuation of the species.

One could also profitably explore the present and former status of a species, fluctuations in numbers from year to year, and the natural checks that ultimately reduce excessive populations.

A fascinating study could be made of the wildlife in relation to the human community. I have in mind the local names of animals and prevalent ideas concerning their habits which are believed by country folks in various parts of our country. In parts of Georgia and Florida, a turtle (*Gopherus polyphemus*) is simply called a gopher. The pocket gopher, a mammal, as everyone should know, is alluded to as a salamander, while the true salamanders are often lumped as "lizards."

★ NATURE

Reprinted from Kansas City Star, *June 12, 1952.*

SKIMMING BIRDS IN THE EVENING SKY PUT ON A SHOW TO SOOTHE THE NERVES

Cutting Graceful Patterns, the Nighthawk and Smaller Species Take Their Food on the Wing, High Above the Treetops — Some Interesting Sidelights on the Misnamed Hawks, the Swifts and the Swallows

By Henry Harford

ONE need not be poetic or even articulate; any plain soul, weary of people, politics and war, can respond to the tranquillity of a summer evening.

The pastoral beauties of long summer twilights, enjoyed by earlier generations, are seldom available now, even to suburbanites. Yet, with the park system, nearly every Kansas Citian at the end of the day can find a spot near his home where he may possess a bit of the summer sky. Trees and utility wires may belong to others, but full title to the sky, from tree tops to the highest visible cloud, goes to anyone with the capacity to enjoy it.

The real owners of the sky are birds; not the earthbound robins and sparrows going about their evening chores at tree level, but the spir-

Know the Mammal Literature

Profitable research and new facts can be established only by knowing that which has previously been accomplished. To this end, the prospective investigator must have more than a passing knowledge of the literature dealing with the species under consideration. Some of the finest life history contributions, of monographic scope, have been completed by amateurs with little academic training. The will to learn and the ability to continue a local study over a period of several years is the best incentive.

Do not be deluded into thinking all has been done. For the student of life histories, the field of mammalogy holds great promise.

Scores of fine investigations will be made in the next decade or two. Plan a study on any common species and pursue it for a year. You will almost certainly be assured of uncovering new facts that are worth recording, and you will have no end of fun to boot.

IN THE NEWS ★ ★

Birds of the evening air must usually be identified by silhouette rather than markings . . . left to right are the chimney swift, the purple martin and the nighthawk, shown in their comparative size . . . the bold markings on the nighthawk are sometimes visible.

ited creatures of the upper air whose wings are never folded except in sleep. Several species are in this group. Since all birds appear black against the sky, identification must be made by silhouette.

Nighthawk Is No Hawk

Largest and most striking is the nighthawk, which is no hawk at all. It lacks the talons of true hawks and its wide, blunt beak is designed, not for tearing flesh, but to seize flying insects. It is one of the goatsucker family, so named from the belief among European peasants that these birds steal milk from goats in the fields at night. Other members of the family are known only as voices in the night—whip-poor-will and chuck-will's-widow.

Nighthawks are active during the late afternoon and early night; and again at dawn. The day is spent sleeping in some tree on a horizontal branch, always perched lengthwise. In this position, the bird resembles a broken stub and is seldom noticed, although rather common about the city.

In flight, it takes a few erratic, unhurried wingbeats and then glides. The call note is a distinctive "peent," audible at a great distance. During the nesting season, the nighthawk dives sharply with wings set at an angle to produce a peculiar sound. It has been described as a boom but it is not explosive. It seems to serve as a song directed toward the mate on a nest on some roof far below.

A century ago, nighthawks nested on bare gravel in open spots such as creek beds or sand bars. So perfect is the protective coloration of the plumage that other concealment is unnecessary. With the advent of the white man and his flat, gravel-covered roofs, the birds have moved to town.

Swifts Just Keep Flying

The most common bird of the evening sky is the chimney swift, often miscalled the chimney swallow. It is more nearly akin to the hummingbird. Swallows alight habitually on wires and, except for the martin, tend to hunt insects fairly close to the ground. Swifts seldom descend to tree-top level and never alight anywhere except to cling to the inside of brick chimneys. Formerly, they rested inside hollow,

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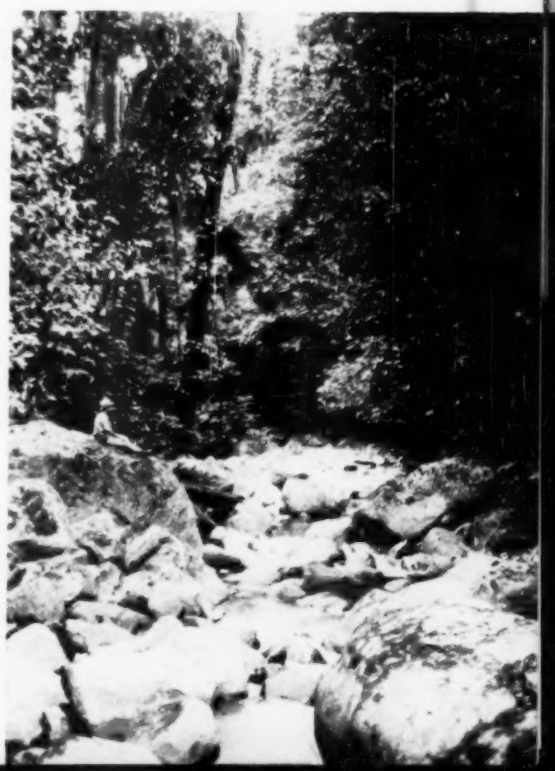
DON ECKELBERRY

The ROYAL Flycatcher

All photographs by the author

By Alexander F. Skutch, Jr.

The "nest" (upper), which the author first thought was driftweeds, accumulated by flood waters. The mountain stream (lower) near which the royal flycatcher hung its nest.



OF all the flycatchers' nests known to me, one of the most remarkable is that of the royal flycatcher, *Onychorhynchus mexicanus*. It bears so little resemblance to a conventional bird's nest that the uninitiated may fail to recognize it for what it is. At least, this is what happened to me when, many years ago, I first made the acquaintance of the royal flycatcher and its work among the magnificent forests of the Caribbean slope of Honduras.

After a somewhat hazardous scramble down a steep slope overgrown with small palms that bristled with wicked needle-like spines, I sat to rest on a mossy stone at the brink of an enchanting mountain stream. To my right the cool, pellucid waters came rushing and leaping down their narrow rocky bed, here pouring over a ledge in a glistening spray, there dashing against great boulders verdant with moss. Although there was a bright sun, the light was dim beneath the giant trees whose lofty boughs interlocked far above the channel. The profusion of ferns of many kinds, the begonias, the orchids, the great-leafed aroids, the bromeliads whose rosettes held little pools of water, the cord-like roots sent down by

Drawing by Don Eckelberry

air-plants perched far above me in the treetops—all bore testimony to the richness of the vegetation in this lowland forest. But in the dim underwood birds were neither numerous nor brilliant. I waited long before I found one which made its home in this sequestered woodland dell.

At last I became aware of a brownish flycatcher of medium size, with pale yellow underparts, tail of a warm shade of dull orange, and an olive-colored crest that lay flat across the bird's crown, projecting in a tuft at the back of its head. When the bird raised this crest slightly, I caught a glimpse of bright red concealed beneath the dull covering feathers. But I did not yet know that this modest bird was one of the most regal of flycatchers, nor did I anticipate the splendor of its crest when fully displayed. The strange flycatcher hovered among the boughs above the cliff across the stream, and uttered at intervals a loud, piping whistle that possessed a weird, melancholy quality as I heard it emanating from amidst the dark shadows of the foliage, rising above the loud murmur of the mountain torrent—a quality in keeping with the wildness of the setting and in turn enhanced by it. Soon this bird's mate appeared, similarly clad. Like most flycatchers, they were active birds, snatching up insects in their broad, flat bills.

Presently one of the flycatchers clung for a moment to a long, irregular mass of brown vegetable material that dangled above the stream, attached to a slender, hanging, green vine. This had been in full sight of me the whole while I sat upon the boulder, yet had failed to excite my interest. When my attention was at last drawn to it by the bird, I took it to be an accumulation of driftweeds such as one often encounters in the boughs of low trees along streams subject to flooding, stranded there by the last high water. But when one of the flycatchers flew up to it a second time, I began to suspect that the bird's purpose was not merely to pluck a stray insect from its surface. Remembering that the nests of the tropical flycatchers present a wide variety of forms, I thought that perhaps this was such a structure, although far different from any bird's nest I had ever seen. Stepping carefully on slippery, moss-covered rocks, I crossed the channel. By balancing myself precariously on the outjutting point of a ledge that overhung the water, I could reach and draw down the vine that supported the puzzling mass of vegetation. Among its tangled constituents were the long, thread-like flower-stalks of a small tree, fibers of various sorts, rootlets, a few dead leaves, and a few tufts of green moss. My suspicion that I had discovered their nest grew stronger as the flycatchers darted above me piping their protests. But the accumulation was so flimsy and irregular that I could make neither head nor tail of it; I found neither eggs nor any cavity that might hold them.

Only after dedicating several more hours to watching the birds, and making a second and more thorough examination of the pensile mass, did I convince myself that it was in fact a bird's nest and already held an egg. In subsequent years, in Guatemala, Honduras, Costa Rica and Panama, I have found about a dozen more of these extraordinary structures. Although they displayed a certain diversity in detail, all were essentially similar to the one above the mountain torrent which first confused and then delighted me. The nests of the royal flycatcher seem invariably to be suspended above a stream, which may be wide or narrow, swift and tumultuous or slow and meandering, may traverse unbroken forest or flow between cleared lands with a mere fringe of trees along the banks to give it shade. Attached to the ends of slender, drooping branches or thin, dangling vines, the nests hang from about 8 to 20 feet above the water. At two nests which I watched, the work of construction was done by the female alone. Her mate at times kept her company while she built, but brought no material. Two or three weeks or even more may be devoted to the construction of the elaborate nest. One female did the greater part of the building in 12 days, but delayed 10 days more before laying the first egg.

When completed, the long, slender nest measures from three to five feet in length.

It took a second thorough examination to be certain that this flimsy structure was a bird's nest.

The long, thread-like, male flowers of a small tree, *Myriocarpa*, used for nest material by many birds.

The female royal flycatcher incubates her two eggs for 22 days, with no help from her mate.

The young royal flycatchers remain in the nest for more than a week after they are fully feathered.

Part of this length is accounted for by a loose wrapping of fibrous materials covering over the supporting twig or vine, but the nether half hangs free below the support. Near the middle of the total length of the structure, but always in the free-swinging portion, the fibrous materials are spread apart to form a niche or open chamber, about 4½ inches in height by 2½ inches in diameter, which holds the eggs and nestlings. The doorway in the side is almost as long and broad as the chamber itself; it reaches so near the bottom of the cavity that the eggs seem to be in danger of rolling out with a little shaking. Thus after devoting a great deal of time and material to the construction of an elaborate edifice, the royal flycatcher places her eggs in an open, exposed position. Yet most of the flycatchers which build pensile nests provide snug, well-enclosed chambers for their eggs and little ones.

The eggs, regularly two in a set, are laid within an interval of two days. They have a most peculiar aspect, quite different from that of any other flycatcher's eggs that I know; and of all the flycatcher eggs that I have seen, they are the darkest in hue. Deep reddish-brown on the thicker end, they pale to dull buff on the sharp end. The dark color assimilates the eggs to the brown materials of the nest and makes them less conspicuous in the open niche.

The female royal flycatcher incubates with no help from her mate, which darts back and forth over the stream and through the adjoining woodland, from time to time uttering his mellow whistle. She sits invariably with her head at the back of the niche and her orange-tawny tail projecting horizontally through the doorway into the outer air. Were she to sit in the reverse position, there would hardly be room for her tail in the nest. This tail, despite its fairly bright color, is far less conspicuous than one might suppose. As she sits in the shaded interior of the open niche, her head turned sideways beside the rear wall, the olive-brown bird is too dull a figure to attract attention. Her tail, especially when illuminated by a sunspot filtering through the foliage above, is so much brighter than the modestly attired bird herself that it seems a thing apart from her—a freshly fallen leaf of lighter hue that has been caught up among others in the tangled mass of vegetable fibers that constitute the nest. One royal flycatcher, which I watched for an entire morning, sat on her eggs for periods ranging from 9 to 32 minutes in length, alternating with recesses varying from 4 to 18 minutes. After 22 days of this leisurely routine, her two eggs hatched.

The newborn nestlings are blind and utterly naked, devoid of the sparse natal down usually found upon flycatchers and other passerine nestlings. Fed and brooded by their mother alone, they develop slowly. At the age of a week their eyes are still closed and their sprouting plumage still tightly ensheathed. When they are 10 days old the eyes begin to open and the feathers to escape the horny sheaths. At the age of 12 days they are fairly well covered with plumage. Although in all other species of flycatchers that I have studied the juvenal plumage is essentially similar to that of the adults, with the royal flycatcher the feathered nestling in its barred attire is strikingly distinct from the parents, whose plumage is only obscurely barred. Narrow, alternating bars of yellowish-buff and dusky cover all the nestling's upper parts and also the foreneck and chest. The belly, sides and flanks are sulphur yellow. The nestlings' barred upper plumage blends into the pattern of light passing through the enmeshed fibers of the surrounding walls of their little niche, thereby making them less conspicuous.

From an early age the nestlings rest in their shallow niche with their heads at the rear and their sprouting tails in the doorway—exactly the same orientation as their mother assumes while incubating and brooding. To feed them she clings to the side of the nest below the doorway and passes over their backs the insects which form their fare. As they grow older the youngsters become very crowded in their narrow, swinging cradle, which seems barely wide enough to hold one with comfort. During the last of their three weeks in the nest one nestling usually rests upon the

other. Now they spend much time preening their barred plumage, and when engaged in this activity sometimes spread their small orange crests, just as their parents do while preening. At times they utter, in a voice slightly weaker than their mother's, a note much resembling her mellow whistling.

The young flycatchers linger in the nest for more than a week after they are feathered, then depart at the age of 21 or 22 days. With three or four weeks for building and laying, three weeks for incubation, and an equal period for rearing the nestlings until they can fly, the nesting of the royal flycatcher is a leisurely, protracted occupation. Although some other small tropical flycatchers take an equal period to raise a brood, no small bird of the North Temperate Zone could afford to devote 9 or 10 weeks to the rearing of only two nestlings. The actual occupancy of the nest by eggs and young covers about 45 days. Since the nest itself is conspicuous where it hangs in the free space above a shady watercourse, one wonders how it escapes predatory visits during this long period. Remembering my first baffling experience with a royal flycatcher's nest, I at one time held the theory that it escapes predation through its failure to resemble a typical bird's nest. However, I have seen nest-robbing toucans examine with intention empty structures of this kind, and I doubt not that royal flycatchers' nests are recognized for what they are by the egg-eaters and the nestling-eaters which have been their neighbors for countless generations. But if the nest itself is a conspicuous structure, the coloration of eggs and nestlings has been modified, in a manner unusual in the whole great flycatcher family, to make them more difficult to detect in their open niche in the irregular and confusing mass of vegetable material. Still, I believe that the chief factor in the safety of eggs and nestlings is the inaccessibility of the nest when well situated. Hanging above water, at the end of a long and slender support, it would seem to baffle the attempts to reach it of most wingless predators, and even of such winged ones as the clumsy toucans, which must cling to some fairly substantial support while they gather food. My conclusion is that the security of the royal flycatcher's brood depends chiefly upon its inaccessibility, to a lesser degree upon the protective coloration of eggs and nestlings, and perhaps in some measure upon the failure of the pendulous mass to resemble a conventional bird's nest.

Artists like to depict the royal flycatcher with his regal crest fully expanded; yet one may spend many hours watching the living bird without being rewarded by this marvelous spectacle. Most of the time the royal flycatcher is a plainly clad bird wearing at the back of its head a little tuft of feathers which fails to suggest unusual splendor. Rarely one catches a glint of brilliant color between the slightly parted olive feathers that cover the folded crest. Probably the crest is displayed in courtship, in conflicts between rivals, or while attacking intruders which jeopardize the nest; yet I have never witnessed these events.

Once, when I took shelter from a sudden shower by crouching beneath an outjutting rock beside a mountain torrent, I had the good fortune to behold the expanded crests of a pair of royal flycatchers whose nest hung above the stream. Enjoying the downpour which I vainly strove to avoid, the birds were washing and preening their plumage on neighboring boughs. In the general shaking-out and rearrangement of feathers, the flycatchers' headdress was not neglected. First the male raised his crest and spread it fanwise to its fullest extent, until it encircled his head as a glorious halo, a scarlet aureole bordered with spots of bluish-violet and velvety black. Then the female opened out her queenly headgear, as widely spreading as her mate's but slightly paler in hue. The display lasted less than a minute; the gorgeous diadems were all too soon folded away; and the birds were transformed once more into plainly attired hammerheads, fit for the domestic cares which at this season engrossed them. But while crouching beneath the dripping rock I had beheld the regal splendor of the royal flycatcher—his title to a place among the aristocracy of birds.

Many Americans will travel far to see a golden eagle in its wild mountain home; others condemn it. The Director of the Wilderness Society ponders the future of a bird with

A PRICE ON HIS GOLDEN HEAD

By Olaus J. Murie

I AM glad that we happened to call it golden eagle. Probably the name refers to the brown hue on the top of its head and neck, but if you like you may have it denote your estimation of the bird and your experience with it.

For instance, a group of us in the Teton Mountains of Wyoming, just below timberline, were returning from Lake Solitude, with the down trail leading into the scenic grandeur of high country. We had been engrossed with the alpine flowers, especially those upland varieties of the Indian paintbrush that come in shades of pink, yellow, even white, as well as the deeper red. Then someone exclaimed: "Look! Golden eagle!"

We forgot the flowers and all the other loveliness that clings near to the earth. Out there in the space among the encircling peaks was a great bird, moving slowly on massive outstretched wings, which barely wavered as they felt the air currents that kept the bird aloft. On an easy glide, with perfect control and composure and, it seemed, with inexorable purpose, the eagle floated into our canyon. For a long time it appeared to hang there above us, but it must have been only a few moments before it slanted on a long downward course and settled into the vegetation on the opposite slope, where it was lost from our view. It was only a brief incident, but there was in it the significance of man's poetic thought of the eagle from ancient times, and I knew that these were better mountains because the eagle was there.

In northwestern Nevada I came on a prominent bluff, a tall rock that stood as a solid landmark in the desert round about. On a ledge almost a hundred feet from the ground was a mass of sticks, and below were the telltale white guano streaks that

Drawing by the author.

meant an occupied nest. Far up in the blue of the sky was silhouetted a golden eagle, circling.

Somehow an eagle's nest is a challenge and next evening I returned with a rope and large-sized aluminum bands. There was no chance for a direct approach from below, where the cliff was smooth and vertical. But I had little difficulty in climbing to the summit of the rock from behind. From there I worked my way down until I came to a sheer drop of 10 feet to the nest. There was a convenient boulder, a huge safe one, around which the rope was fastened. Then it was easy to descend the remaining distance, clinging to the rope.

This was not a hair-raising experience, and not much happened. But there developed a situation that keenly affected my sensibilities. As I hung on the rope, and lowered myself one handhold after another, my feet presently touched the nest. I reasoned that it was anchored firmly on solid rock, and eased myself down. I was greeted by the indignant remonstrance of a full-grown eaglet, which backed over against the stony wall, with beak open, wings partly spread, and with that sharp look in the clear eyes that seemed to pierce my soul. What business had I here? I felt that I was desecrating a sacred place by my presence, and of course I was if we grant that any home is sacred to the owner. I confess that I felt guilty as I settled down in the nest opposite the outraged eagle, so strong was the eagle influence over this place on the cliff, secluded from the other-world of men. I was conscious, too, of long established respect and admiration for this bird of freedom and power, a bird of the heights that has helped to lead our own aspirations to the clouds. Even now I knew that the parent bird, having learned to fear the devastating weapons and persecution that are becoming a part of the culture of modern man, was circling in the sky above its home, with great anxiety watching the outcome of this invasion.

When will we learn that a dead eagle can be both a spiritual and economic loss? Photograph courtesy of *The Oakland* (California) *Tribune*.

I hesitated a little about the next move, but I had in mind one of my purposes in climbing to the nest. I seized both feet of the eagle in one grasp, to immobilize those powerful claws, and in the interest of science proceeded to attach a numbered aluminum leg band. When I then released the youngster, it backed over to the other side of the nest we were sharing, as far from me as it could get, and glared at me with those splendid eyes.

A little later I shifted my position. The young eagle suddenly lurched to the outer edge of the nest and took off into space! Here was the first flight of a young eagle! I remembered the first time that, as a boy learning to swim, I took off across the deep part of the river. Did this youngster experience that blending of daring and apprehension in his initial venture into thin air? Or was everything overshadowed by the desperate fear of man? It wobbled a little, finding its wings and feeling for the air, but actually it did pretty well and made a good landing quite a distance out on the desert.

There I was, left sole possessor of the eagle's aerie. I looked about me and counted the feet of 36 jackrabbits that had been brought to the nest to feed the lone eaglet. I found remains of a cottontail and ground squirrel, and feathers of a sage grouse. The nest was actually carpeted with rabbit feet.

I sat there for a bit and looked out over the desert landscape that must have become very familiar to the little eagle that grew up in this rocky niche. Many times his keen eyes must have seen bands of antelope passing through the sageland below; perhaps at times a black-tailed jackrabbit nibbling at bushes. No doubt it had idly regarded flies or spiders moving about in the nest, or a lizard on the rock wall. These would be the details that filled the youthful period of a growing eagle, the little events between the exciting visits of the parent with food. Patiently, over the weeks, the bird had grown to full size in preparation for the initial flight into eagle adventure that I had witnessed a few moments ago.

The sun had sunk low in the west, behind some dark storm clouds, and a wind had sprung up. I had the thought of night coming on, and here was I perched high in an eagle's nest. I began to feel uneasy, with a touch of loneliness that I have experienced at such times, yet there was a bit of elation over intimate sharing with an eagle its lofty aerie. I turned to the rope and clambered up, hand over hand, to the safety of the easy descent.

I recall another occasion when I invaded the intimate domain of the golden eagle. The nest this time was in a small wooded canyon, on a ledge that was rather easily reached from above. I had my three year old son with me and thought it would be of interest to let him become acquainted with little eagles in their own home. So he and I lowered ourselves into the big nest and I sat by while he delivered friendly baby talk to the two baby birds. One of the eaglets resented the intrusion and glared back with open beak. We soon withdrew and left them in peace.

How can one express the qualities that have placed the golden eagle so high in man's estimate? How, for that matter, do we explain a human friendship, and should we try? The figure of the eagle has a prominent place on the seals and insignia, the flags of nations, to signify each nation's prowess and worthiness. We who have been so earthbound physically have aspired to heights spiritually and have seized upon a symbol to help us climb.

Are we justified in attributing prowess to the golden eagle? Here are some facts. In areas where this bird has been studied it has been shown that the daily, routine diet consists of rodents such as rabbits, ground squirrels, prairie dogs, marmots, and some grouse, as well as whatever carrion it may find. In this it is similar to birds of prey and carnivores generally. But occasionally the golden eagle takes a mountain sheep lamb. Moreover, there are known instances when two or more eagles together have killed an adult buck deer, and adult pronghorn antelope. In fact, I know of one instance when two of these birds attacked a young elk in winter, though it was an animal weakened by disease or malnutrition. This is pretty big game for a bird equipped only with its two taloned feet as weapons.

Will not our history be nobler for having helped a wild creature now in great difficulty? Photograph by Harry Vern Truman.

The author's three-year-old son talking to two young golden eagles. Photograph by Olaus J. Murie.

Imagine a modern sportsman going after a buck deer without a gun or bow and arrow!

Another fact is that there is not evidence to show that the eagle's occasional sampling of venison or wild mutton seriously affects the game populations. The rodent diet is still the prevailing one, and only occasionally do the eagles attack the larger animals.

But the eagle will attack a domestic lamb as well. This bird, whose way of life has developed through eons of time when a lamb could be taken for food with no man present to lay prior claim to the killing, does not realize that things are different now. In this day lamb chops are not for eagles, and man's own struggle against man demands that he retain every morsel of profit that can be squeezed out of his environment. So—to a considerable extent our admiration for a fellow mountaineer, our delight in a bird that has inspired mankind from the times of our most primitive cultures, have dimmed, and we begin to see its figure through the haze and smoke of a materialistic culture. Instead of a line of poetry or an uplifting expression of generosity on our front page, we find the effigy of a man holding a dead eagle, wings spread, exulting in the fact that they span so many inches and that so-and-so killed it.

There is at stake, not only the fate of a great bird, but our human capacity to tolerate, to appreciate, and to enjoy. Photograph by Harry Vern Truman.

It is true, of course, that economics and personal welfare are necessary to normal living. It is easy to belittle an economic loss when it is not our own. If we respect our conscience we must be fair. But we have here a social complex that requires fairness on *all* sides. We need the routine materials for physical existence, but we need as well the resource for spiritual well-being and what we know as happiness. Fortunately, there has been nurtured in the human heart, although at times precariously, what we call generosity. I am happy to say that I have found this among many of those who raise livestock; who deprecate their losses caused by wild creatures by the comment: "Oh, well, I kind of like to see them around."

I resent the organized efforts to assemble statistics to prove to such well-intentioned countrymen that their losses are severe and should be remedied. In other words, I resent propaganda to convince such people that their good natured generosity is misplaced—propaganda to convince them that they are really unhappy, after all.

I can offer no specific plan, beyond this. We need a great deal of organized information. What are the *natural* food resources for the golden eagle (and for other creatures in that category)? Are we so adminis-

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[The fourth in a series of articles about]

YOUR *Wildflower* GARDEN

There are many kinds of flowers you may plant to attract hummingbirds.

Allen's hummingbird feeding at a blossom of tree tobacco, *Nicotiana Glauca*. Photograph by Robert S. Woods.

By Charles E. Mohr

MIDSUMMER flowers have bright, gay blossoms in contrast to the pale, delicate hepaticas and spring beauties, or the fragile white anemones, bloodroot, and Dutchman's-breeches that bedeck the leafless spring woodlands.

The showiest belong to a sun-loving clan growing in field, marsh, and roadside—black-eyed Susan, Canada and Turk's cap lilies, day lilies, butterfly weed and wild rose. Most vivid of all is cardinal-flower.

Highlight of any trip along streams and marshland is the sight of this scarlet lobelia, often scattered singly or in small groups close to the water's edge where its shimmering reflections double the enjoyment of the discoverer. The cardinal-flower may be found from Florida to New Brunswick and west to the Rocky Mountains, blooming from July through September.

Growing 2½ to 5 feet tall, it is too narrow and erect when full grown to transplant easily. Fortunately, this perennial grows well from seed. Also, since new plants develop from offshoots sent out from the top of the root of the "mother" plant, clumps can be separated in spring or fall.

In the wild, cardinal-flower grows in open marshland in full sunlight; along streambanks it often is lightly shaded at least part of the day. Under cultivation, however, it seems to do best in the well

The black-eyed susan of our dry roadsides, originally a wildflower of the western prairies, invaded the eastern United States after the forests were cut off. Photograph by W. Bryant Tyrrell.

The black-eyed susan, *Rudbeckia hirta*, is one of the coneflowers, of which Goldenglow of our garden borders, is a well-known variety. The coneflowers do well in open sunny places, are easy to grow in any warm, easily worked soil, and are adapted to dry, exposed sites where many other plants cannot grow. The plants may live two years, or perhaps only one year.

shaded wild garden, and will grow in fairly dry places. With moister conditions it tolerates more sun.

In northern gardens many of these plants are lost as a result of freezing. If provided with a leaf mulch several inches thick, they should survive even in severe winters.

The scarlet clusters of 15 to 20 flowers signal hummingbirds like a battery of red neon lights. As in all lobelias, the flowers are tubular, offering the long-tongued ruby-throat a sweet reward. In addition to the nectar, the brush-tipped tongue sweeps up tiny insects that sip the same syrup, thus supplementing a carbohydrate diet with a serving of protein.

In these days of shortsighted drainage or filling in of marshlands, and thoughtless gathering of wildflowers for bouquets, cardinal-flower has been completely exterminated in some areas. In localities where it is gone or is becoming rare, plant lovers should consider propagating it by seed in suitable areas which can be safeguarded from exploitation.

For those who would enjoy the company of hummingbirds, there are other wild and cultivated plants that are equally irresistible to birddom's jeweled midgets. One of the easiest to grow in the ordinary garden is the bright red bee balm or Oswego tea. These flaming tufts look best in mass planting along the bank of a stream or in a sunny corner of the garden. They spread swiftly and may be divided each year, preferably in spring to minimize danger of winter kill.

Possibly the best known "hummingbird plant" is the trumpet creeper, *Bignonia* (or *Campsis*) *radicans*. Famous as it is through its representation in Audubon's ruby-throat plate, the trumpet creeper could be grown

Drainage or filling in of marshlands and thoughtless picking of wildflowers, have eliminated the cardinal-flower from many of the wet or moist areas where it once grew commonly.

Cardinal-flower, *Lobelia cardinalis*, is a native plant of streamsides, pond borders, and marshes from Canada to Florida and west to the Rocky Mountains. It can be grown from seeds or by dividing the plants. In some parts of the country, it winter-kills, but may be protected by covering the plant with 4 to 5 inches of forest leaves before the ground freezes. The cardinal-flower is especially suited to boggy or moist places beside a pool, pond, or stream.

far more widely than it is at present. Hardy over two-thirds of the United States, it flourishes in smoke-ridden cities as well as in suburbs and countryside. The fast-growing, handsome woody vine is ideal for screening unattractive walls and outbuildings. Its orange and scarlet blossoms are five to six inches long, forcing the hummingbirds to probe so deeply that the birds' foreheads are dusted with pollen. Flying from flower to flower, fertilization is assured.

In his popular plate of the ruby-throat, Audubon painted 10 hummers perched or feeding on the showy trumpets. This surprising assemblage has been criticized as unnatural—an example of artistic license. Yet one of my most vivid memories of hummingbirds is a scene in the red hills of the Pennsylvania Dutch country. There one midsummer day I found a high stone wall ablaze with trumpets and literally swarming with hummingbirds—at least 25 at one time!

This spring at the Audubon Center, Greenwich, Connecticut, we have watched hummers making regular rounds of such familiar garden flowers as coral bells (Heucheria) and wild bleeding heart, the graceful blossoms of the wild azalea or pinxter bush, and the purple spikes of Ajuga.

In the Far West there are a dozen kinds of hummers and a great variety of colorful plants known to attract them. Among the best shrubs are the red-flowered chuparosa, the salvias, and woolly blue curls or romero. The handsome Morteon Bay chestnut or black bean, an Australian evergreen in San Diego's Elysian Park, is famous for its hummingbird visitors. Favorite western flowers include the scarlet larkspur and many of the penstemons.

The President *reports to you*

By John H. Baker

President of the National Audubon Society

Wild Bird Plumage Amendment Adopted

AN important milestone in bird protection has been reached in the recent enactment of amendment to the Tariff Act with regard to importation of wild bird plumage. The bill, jointly sponsored by seven national organizations, including your Society, and introduced by the Hon. John D. Dingell, was unanimously approved by both the House Appropriations and the Senate Finance committees, came up on the consent calendars in both Houses and was, in each case, passed without objection. It has been signed by the President.

You will remember that, after the Tariff Act was amended in 1922 to permit importation of unlimited quantity of wild bird plumage of any kind for use in the manufacture of artificial flies used for fishing, advantage was taken of the loophole thus afforded to bring in substantial quantities and divert same to millinery uses. Effective enforcement against false affidavits and diversions proved to be difficult.

Furthermore, an abuse that grew to considerable proportions was the importation of wild bird plumage on false affidavits that it came from birds that had been "raised in domesticity" abroad. The new amendment to the Act spells out exactly what the 10 kinds of domestic fowl are, the plumage of which it will now be legal to import and this list conforms to the present definition of domestic fowl in the New York State wild bird plumage law. It states that the prohibition of importation of the feathers or skin of any bird shall not apply to any of the 10 enumerated species of domestic fowl "other than any such bird which, whether or not raised in captivity, is a wild bird." In the official committee reports it is clearly set forth that "it is understood that a species of wild bird is considered to have become domesticated after the second generation in captivity." In other words, it is not domestic until the third generation in captivity; this definition conforms to previously existing policy of the Department of the Interior.

You will remember that in 1942, a year after New York State had translated into law the features of a joint declaration of policy arrived at by Feather Industries of America, Inc., and your Society, designed to bring to a complete end in New York State the importation of any plumage of any wild bird, an amendment was enacted, in spite of your Society's opposition thereto, that provided that any kind of wild bird plumage in unlimited quantity might be imported, possessed, offered for sale and sold, provided it was for use in the manufacture of artificial flies used for fishing, and provided that the importer, exporter, purchaser and seller be licensed by the New York State Conservation Department to do so. A principal argument in favor of that amendment was the fact that the Tariff Act permitted unlimited importations of wild bird plumage for that purpose. The new amendment to the Tariff Act nullifies, in effect, the 1942 amendment to the New York State wild bird plumage law.

The absence of controversy in connection with the enactment of new amendment to the Tariff Act demonstrates the value of gaining agreement of all the principal parties at interest prior to the introduction of legislation. Those of you interested in further details may wish to refer to pages 124-126 in the March-April, 1951 issue of *Audubon Magazine*.

California Camp Digs Out from Snowdrifts

By far the heaviest snow in many years fell in the Sierra of California last winter. The location of the stalled Southern Pacific train, headlined in the newspapers, was but a few miles from the site of the Audubon Camp of California at Sugar Bowl Lodge, near Donner Summit. There was more than 20 feet of snow pack at Sugar Bowl. You may well imagine that we were considerably disturbed as to whether it was going to prove possible to open the camp as scheduled on June 15. As a matter of fact, there was some six feet of snow pack still there when camp opened. Had it not been for the cooperation of the County Road Superintendent and his rotary snowplows, not to mention that of the President of the Sugar Bowl Corporation and the persistence of a camp director and staff that overcame insuperable obstacles, the opening on June 15 would have been impossible. When Director MacCaughey and a few of the staff first arrived, it was snowing hard, with big drifts and a temperature of 19 degrees. The biggest struggle, before camp opened, was getting in the food and fuel. The students were surprised and quite delighted to find as much snow. The staff children thought it wonderful. Pussywillows were in bloom and the catkins on the alders were hanging down. The summering birds had arrived. The brook flowing by the Lodge was a torrent. On July 3 Director MacCaughey wrote "the rush upward of bright green vegetation, where yesterday was a snow field, is almost fantastic." All the summer Audubon Camps got off to a fine start.

Georgia Leads the Way

We have long felt that one of the particularly worth while activities of a local Audubon Society is the stimulation of organization of Audubon Junior Clubs in its own community—whether in the schools, among troops, 4-H clubs, Future Farmers, recreation groups or summer camps—yet the existence of special committees for that purpose is, generally speaking, notable by its absence. It is our feeling that every branch and affiliate would find the accomplishments of such a committee highly rewarding. It is not simply a matter of getting Junior Clubs organized, but also of acquainting the leaders with the character of the educational materials available from the Society. Usually these leaders prove keen to make use of the materials but claim that they have never heard about them or knew of their existence.

As an outstanding example of "where there's a will there's a way," the President of a new branch, the Floyd County Audubon Society, Rome, Georgia, working with the Superintendent of Schools, has organized an Audubon Junior Club in virtually every grade in every school in that county. There are 145 such clubs.

Another Disney Success

Walt Disney has produced another beautiful nature film, "Water Birds," which many of you may have seen already. If you have not, you will want to. The major part of the photography is the work of Audubon Screen Tour lecturers. Disney has again combined fine music with wildlife motion and sound in an extremely effective way.

New Florida Refuges

With the encroachment of civilization, under mounting population pressure, people are becoming more and more aware of the importance of setting aside relatively wild areas of scenic attraction in protected form for permanent public recreational use. There are many ways in which the adjective "recreational" might be defined. We do not refer to sand boxes, swings and merry-go-rounds, desirable as those are in their proper place, but rather to appreciative use associated, perhaps, with hiking, boating, observation, picture-taking and refreshment of spirit. It is good news that the Game and Fresh Water Fish Commission of the State of Florida has established refuges on the north fork of the St. Lucie River, including all major tributaries and 200 feet of land on either side, as well as on the Loxahatchee River from the narrows above Jupiter to a point four miles upstream.

All shooting of wildlife, including alligators, is prohibited in these areas, and according to the *Stuart News* "Presence of wildlife, free from molestation, is regarded as a community asset for the Ft. Pierce, Stuart and Palm Beach resort areas, with the growing visitation of the rivers by naturalists and visitors who are thrilled by the sight of Florida's native wildlife."

Sanctuary or Sub-Division?

You will remember that the Society has, for some years, maintained wildlife sanctuaries on a series of islands in Lake Worth, between Palm Beach and West Palm Beach, Florida. Some are under lease from the Town of Palm Beach; others from private owners. An ever-increasing number of people enjoy witnessing the evening flights of white ibis and other water birds coming in to Fisherman's Island, just north of the southern-most of the bridges. A number of roseate spoonbills, though not yet nesting in the area, now frequent it in the late spring and summer. This year, for the first time, a few reddish egrets nested on Fisherman's Island.

The example set by the maintenance of these sanctuary islands in Lake Worth recently stimulated the Town of Manalapan, immediately to the south, to offer a comparable lease on three small islands near Hypoluxo Island and the Society has, with enthusiasm, accepted the offer. It will shortly assume responsibility, with the fullest cooperation of the town officials. Here again is evidence of the fast-growing public interest in setting aside suitable small areas for perpetual sanctuary use before they are overrun with bulldozers and subdivisions.

See You at Convention!

The official nominating committee for directors this year comprises Mr. G. Lister Carlisle, Chairman, Norfolk, Conn., Mrs. Robert C. Wright of Haverford, Penna., and Mr. Gayer G. Dominick of New York City. It will submit its report at the annual members' meeting to be held at Audubon House, New York City, on Tuesday, November 18, 1952.

The 48th Annual Convention of the Society will be held in New York, Saturday through Tuesday, November 15-18. Programs should be in the hands of all members not later than October 15.

Good Year, Say Wardens

The reports from wardens at the sanctuaries in the Gulf states tell us that this has been a great production year for young birds raised successfully to flying maturity. Your President visited, in early June, all of the sanctuaries on the Texas coast where reddish, snowy and American egrets, Ward's and Louisiana herons, Cabot's, royal, Caspian, gull-billed, Forster's and least terns, brown and white pelicans, white and glossy ibises, laughing gulls and roseate spoonbills have had a most successful season. There are other species in small numbers, such as oyster-catchers and avocets.

The principal causes of disturbance are of human origin and require on-the-spot protective service on the part of wardens competent to do a good public relations job in dealing with those who may wish, for whatever reason, to land on the bird nesting islands. The wardens live, in season, in relatively out of the way places and must be able to make their own repairs on cars, marine motors and boats; must have had prior experience in the handling of boats and marine motors, especially under adverse weather conditions. Indicative of their initiative and resourcefulness is the report of Don Gamble, warden at the Second Chain of Islands: "Returned to dike to find boat and motor stolen. Spent rest of day and all night searching for the boat. Efforts rewarded, found boat and motor in good condition in Lamar. Got the man's name who took it and called the sheriff in Rockport. Returned equipment to dike. Decided not to press charges unless the man balks at paying the expenses for my trouble. He has lost his job on the oil rig near my camp as the result. Also lost his motor towing the boat in. Justice will have its way." He also wrote: "Car battery low this morning, radiator hot. Finally found that a poor pilot black snake had crawled under the hood and derailed fan belt."

At Duck Rock off the southwest coast of Florida, a greater number of water birds, especially white ibis, have been roosting this June-July than at any time since the Society began providing protective service. Warden Hank Bennett has kept careful records and the number of white ibis coming in each night has run between 90,000 and 100,000. Some 175 roseate spoonbills have also been roosting there, as well as cormorants, man-o-war birds, brown pelicans and large numbers of snowy and American egrets and Louisiana herons. There have been as many as 32 glossy ibis.

At the time that the Outdoor Writers Association of America held its convention in Miami in June, Charles Brookfield had the pleasure of conducting many of them to Duck Rock. Henry P. Davis, vice-president of the OWAA, subsequently wrote, "That jaunt to Duck Rock will last forever in my memory, for I consider it one of the greatest spectacles in the entire pageant of wildlife."

More Mullet, Please

At Tampa Bay, the rookery on the Alafia Banks has been the greatest in history and more birds than usual have used both Green Key and Big Bird Key. Fred Schultz, warden at the first two, has been feeding a young brown pelican and a young American egret. He writes, "Mac, the pelican, visits us every a.m. for his food. He eats several small mullet and dozens of minnows every day. He wants his food early and plenty of it. No trouble at all to eat four, five or six small mullet. We rescued young American egret from poultry yard on east shore. Took him to Whiskey Stump. Forced food down throat until strong enough to eat without help. Young American egret learns fast. Left food in coffee can, ate it before morning. Spent day around camp. Ate more food in p.m. With the pelican and egret wanting mullet every day, I stay busy at one time or another fishing. Very good that mullet are plentiful here now. I manage to keep a good supply in the refrigerator in case some more "boarders" come flying in. "Legs," the American egret, is developing into a very fine bird. He (?) is always on time for food. Likes mullet best and wants them dressed and in long strips. We don't disappoint him. He is learning to be a fisherman, but it seems he wants to do his fishing from the dock. He stands on the dock watching the minnows swim past and often makes a strike, but he is too far above his fish and the effort is lost. He stays near the camp day and night and gets his mullet twice daily."

Though all this sounds as though Warden Schultz were spending all his time raising two birds, we can assure you that he has been furnishing effective protection to 100,000 or more.

New Audubon Branches

The Cleveland Bird Club, with 1,300 members, has voted to change its name to the Cleveland Audubon Society and become a branch of the National Audubon Society. This announcement was made by Arthur W. Fiske, president of the Cleveland group, one of the largest of its kind in the country.

Other organizations which have recently been enrolled as Audubon branches are:

Appleton (Wisconsin) Audubon Society
Mrs. W. E. Rogers, Chairman of the Board

Blue River Audubon Society (New Castle, Indiana)
Mr. Garland Bookout, President

A. W. Butler Chapter of Indiana Audubon Society (Indianapolis)
Mr. Willard M. Morlan, President

Decatur (Illinois) Audubon Society
Mrs. C. F. Russell, President

Faribault (Minnesota) Audubon Society
Mr. Russell Ziegahn, President

Fayetteville (North Carolina) Audubon Society
Mrs. F. V. Kelly, President

Floyd County (Georgia) Audubon Society
Mr. Gordon Hight, Jr., President

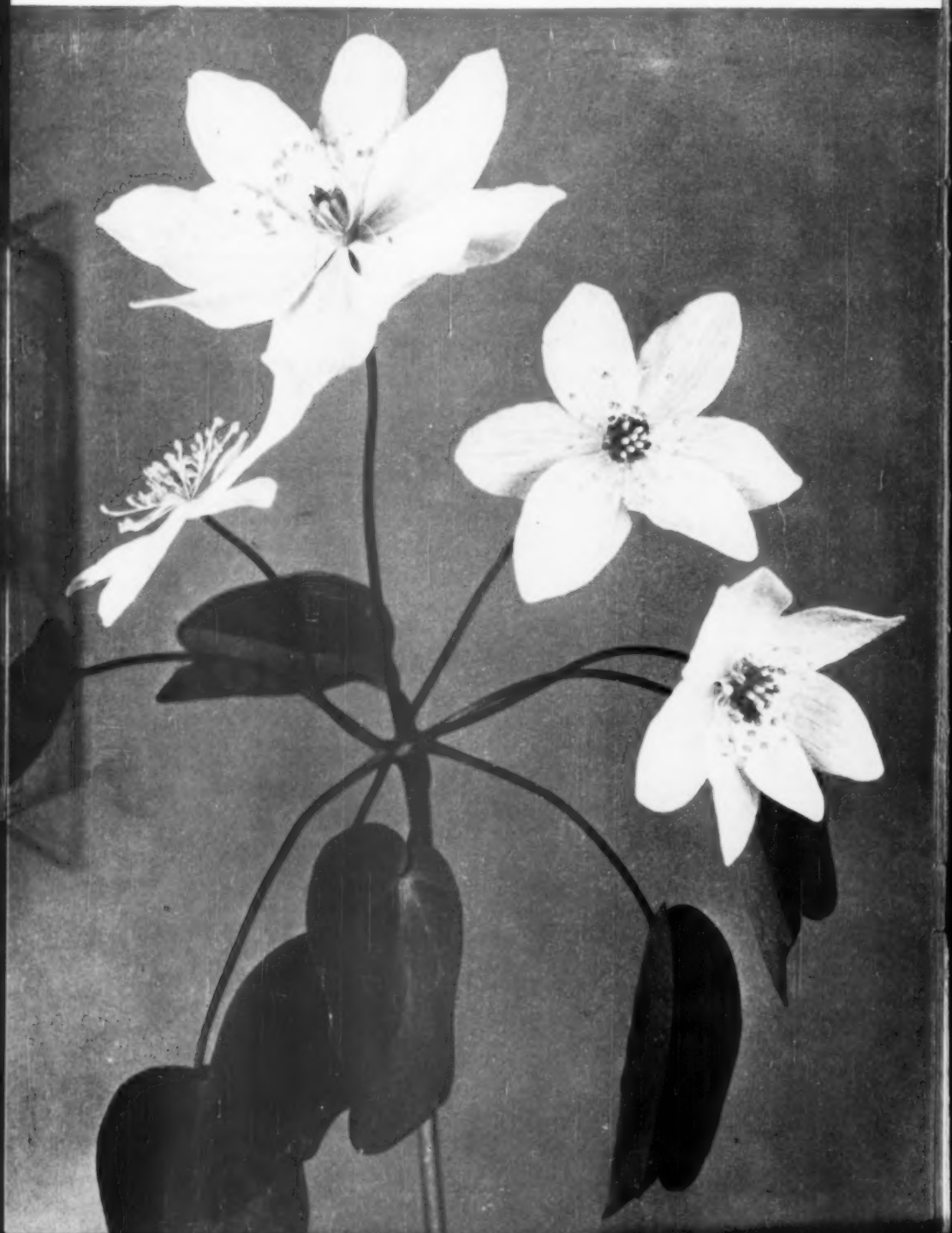
Kaweah Audubon Society (Visalia, California)
Mrs. W. C. Hill, President

Laurel (Mississippi) Audubon Society
Mrs. A. U. Smith, President

Travis Audubon Society (Austin, Texas)
Mr. Bradley Davis, President

Wheaton (Illinois) Audubon Society
Mr. Le Roy Tunstall, President

Many of us may have seen the lovely rue anemone and wanted to photograph it at close range.



WHY NOT TRY CLOSE-UP PHOTOGRAPHY?

By William J. Jahoda

MANY of you who own cameras have probably seen a beautiful flower or some other relatively small object, that you wanted to photograph. Perhaps you moved your camera as close to the object as its focusing ability would allow, and made your exposure with high hopes of obtaining a wonderful picture.

How many of you, who have taken such pictures, have had your high hopes shattered when the finished picture disclosed your flower or other subject as a small, insignificant object that you could barely see. Needless to ask, it is a safe bet that all of you have.

The secret of close-up photography lies, as the word "close-up" literally states, in getting close to the object being photographed. Since most lenses normally cannot focus on an object when it is brought closer than approximately three feet from the lens (except with cameras having double-extension bellows), some means must be utilized to make closer focusing possible.

Take a look at your camera and see in what position your lens is, with respect to lens-film distance, when it is focused at infinity and when it is focused for as close work as possible. You will see that your lens is closest to the film when focused at infinity and furthest from the film when focused for near objects. It is logical to assume then, that if you can in some way extend the lens beyond the limits of the

All photographs by the author.

The secret of close-up photography lies in getting the camera close to the spring peeper or to any other small animal you may wish to photograph.

mechanical stops, you can get closer to the object being photographed.

Extension tubes are one way, then, by which close-up photography can be accomplished. Use of extension tubes, however, is ordinarily limited to use with focal-plane shuttered cameras, as they are, with few exceptions, the only cameras whose lenses can be removed and extension tubes inserted between lens and camera body.

Most "press" type cameras—Graflex, and other similar cameras—have double-extension bellows which are, in effect, built-in extension tubes. Needless to say they work beautifully for close-up work, because of this extension feature, their easily interchangeable lenses and their ground-glass focusing.

One undesirable feature of obtaining close-ups by extending the lens is the fact that exposure corrections must be made to permit normal exposures; when the lens is extended, less light hits the film per unit area, shutter speed and diaphragm opening remaining constant. An easily remembered and very satisfactory exposure correction formula that can be used is:

$$\frac{\text{f stop (as indicated by meter) x focal length of lens}}{\text{new lens to film distance}}$$

For example, after you have taken a light reading on your subject, let us say your light meter indicated a shutter stop of f/16 at 1/50 second, and your camera has a two inch focal length lens (it tells you so right on the front of the lens mount). You then determine the lens to film distance after extension tubes are added by measuring it (use the distance from the rear element of the lens); let us say it turns out to be four inches. Using the formula we now have:

$$\frac{16 \text{ (the f stop previously found) x } 2 \text{ (focal length of lens)}}{4 \text{ (new lens to film distance)}}$$

$\frac{32}{4} = 8$. The correct exposure to use now would be f/8 at 1/50 second instead of the original f/16 at 1/50 second.

The second way by which close-ups can be obtained is by use of supplementary lenses called "portra" lenses, which can be slipped over the camera lens. This is the only way close-ups can be made with cameras having between-the-lens shutters that cannot be removed from the camera.

Portra lenses shorten the effective focal length of a camera lens. The effect of using such a supplementary lens is the same as using a short focal length and extending it

to the focal length distance of your lens. In other words, if you had a two inch lens on your camera and a portra lens that changed its effective focal length to one inch, the effect would be essentially the same as having a camera with a one inch lens and inserting a one inch extension tube to give you the two inch lens-film distance. As we already saw in previous paragraphs, the extension effect makes closer work possible.

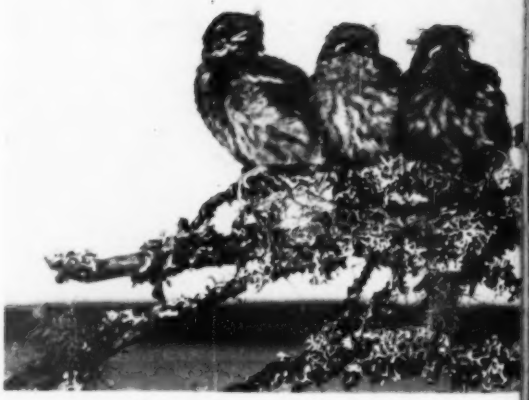
Portra lenses are measured in positive

Continued on Page 266

The flattened nose of the wood turtle, its bright eyes, and horny skin, are strikingly portrayed in close-up photography.

(Part 2, Continued from May-June issue)

Wildlife in a Chemical World



By J. P. Linduska

IN A large-scale experiment on tick control at Camp Bullis, Texas, DDT was applied as a dust with ground equipment and at a rate of four pounds of the insecticide per acre. Those species of birds which normally forage at ground level were reduced greatly by the operation but the effects on canopy inhabitants were nominal.

While four- and five-pound-per-acre amounts of DDT always present critical conditions for birds, the extent of damage is known to vary considerably, depending primarily upon the season of the year. During the nesting season adult birds restrict their movements to a limited territory around the nest and consequently in a treated area of appreciable size they may be confined entirely within a toxic environment. The nesting season, consequently, is a critical period for both adults and young, and it is during this period that heavy applications of insecticides exact their greatest toll.

A characteristic of young birds which makes them especially vulnerable is their prodigious appetites. The food demands of nestling young are proportionately far greater than those of adults, and since the eating of contaminated insects appears to be a main means by which birds are poisoned, it is obvious that this age group would be hardest hit.

At times other than the nesting period insecticides have a lesser hazard for birds. The control of bark beetles which transmit Dutch elm disease requires heavy dosages of DDT, and a single application of three pounds of the insecticide per tree is a good average of what may be used. When spray is applied prior to April 15, before the beginning of the nesting season, this operation has been observed to have a minor effect on birds. But during later periods in May and June the same procedure has resulted in heavy losses.

Applying DDT after the peak nesting season also favorably modifies the effects on birds. In Georgia, four to six and a half pounds per acre have been used to control the pecan weevil, and studies during August revealed only slight losses. In Wyoming, amounts up to seven and a half pounds of DDT per acre were used in experiments to control the Black Hills beetle, an important forest pest. Here, too, where spraying occurred in August after the principal period of nesting and where the area treated was not extensive, mortality was negligible.

The difficulties of exact census work on mammals have limited the accomplish-

At times other than the nesting period, insecticides are a lesser hazard to birds. Magnolia warbler (left) feeding young ones, photographed by Allan D. Cruickshank. Spraying DDT on elm trees early in spring (lower) to control bark beetles. Photograph by Roche.

ments in field studies on the group. The larger, wide-ranging species, in particular, have posed real problems in attempts to procure information on possible effects of insect-control operations. However, at least 20 species of mammals, including such common forms as the cottontail rabbit, raccoon, opossum, skunk, deer, woodchuck, and squirrels of several kinds, were under observation in one or another of the studies. Dosage rates under which observations on mammals were made ranged from a fraction of a pound to seven and a half pounds of DDT per acre. In several of the investigations, intensive live-trapping and marking of small mammals were employed in order that population changes might be measured and any abnormal movements of individuals in and out of plots detected. In one study the effects of repeated applications, such as may be practiced in malaria control, were observed. None of these field investigations revealed any measurable effect on the mammal population, although at the higher amounts of five and seven and a half pounds of DDT per acre, one shrew and several chipmunks were seen in a condition highly suggestive of DDT poisoning. It is likely that with aerial applications the critical dosage for many mammals is near the five-pound-per-acre level. Cottontail rabbits in captivity have been killed by ground applications of five pounds per acre of DDT in oil. Because much of the spray is lost when applied aerially, the ground application of the same amount represents a conspicuously more critical treatment.

As has been mentioned for fish, the hazards to birds and mammals are not limited to a direct toxic action. Birds such as swallows and flycatchers, which partake mainly of flying insects, may abandon an area following spraying with only small dosages of DDT; and mammals, although they are the least sensitive of all wild forms, may be secondarily involved through a depletion of their food supply. In one study, after a comparatively light application of DDT for mosquito control, raccoons were secondarily affected by an almost complete kill of crayfish that had been a staple item in their diet. After gorging on the dead

crayfish for a few days, they were forced by a depleted food supply to leave the creek bottom and seek other fare in the uplands.

A characteristic of DDT that has contributed greatly to its advantage as a control chemical is its extreme stability. Insecticidal properties of the compound are little impaired by sun, rain and other elements, and even the complicated breakdown processes of animal digestion have little effect. An early experiment demonstrated convincingly the unalterable nature of the chemical.

In this instance dairy cows were placed on a diet of DDT-contaminated forage. The material later appeared in the milk and upon extraction was found to kill flies as effectively as the factory-fresh compound. Its potency had been unchanged.

While this quality of DDT may be desirable from the narrow standpoint of its

Airplane spraying insecticides over the western plains to control grasshoppers. Photograph courtesy of U. S. Fish and Wildlife Service.

value as a killer of pests, it presents compensating disadvantages where a chronic toxicity hazard is concerned. And this, in fact, has led to its disqualification as a material for use around dairy cows and livestock, since in addition to its stability it is readily soluble in animal oils. These combined qualities make it possible for livestock through repeated contact to concentrate considerable quantities of DDT in body fat.

If chronic poisoning of this sort is of consequence to wildlife there is no good indication of it as yet. In 1945, biologists of the Fish and Wildlife Service began a long-term test to answer just such a question. For five successive years they sprayed a 106-acre woodland plot with two pounds of DDT to the acre. Detailed studies were made of the birdlife as well as some of the common mammals and reptiles. Their findings at the end of the five-year period showed that the long-term effects were not appreciably different from what occurred following the first year's treatment. It seems likely that most wild animals seldom have opportunity for the continuous, long-term contact necessary for chronic hazards.

From some standpoints the DDT picture today is not so ominous as it appeared a few years ago. Many costly forest pests are effectively controlled with a one-pound-per-acre dosage. This amount appears to have little effect on most forest vertebrates. Even these programs, however, require considerate planning and careful guidance if damage to the highly susceptible inhabitants of productive waters is to be avoided. Of course, a forest that is defoliated or killed outright by an insect outbreak is neither a healthy watershed nor a productive wildlife habitat. And in some circumstances the nominal loss of fish and wildlife accompanying such insect abatement may be heavily outweighed in favor of the ultimate

Spraying DDT during May and June has killed many nesting birds or their young. Acadian flycatchers (left) at nest, photographed by Samuel A. Grimes.

DDT sprays of very low concentrations seem to have little effect on most forest animals, particularly those that live on or near the ground. Cottontail rabbit (right) photographed by Allan D. Cruickshank.

advantages in the over-all wildlife picture.

In agricultural areas many common pests are being controlled with DDT dosages of a pound per acre or slightly more. And where these minimum amounts are recognized, there has been no particular hazard to wildlife. Human nature being what it is, however, there is frequent philosophizing that "if a little is good, more should be better." Such a doubling up on dosage to insure a good kill has resulted in unfortunate and unnecessary losses of wildlife.

Other agricultural pursuits utilize amounts of DDT that assuredly are detrimental to many wild forms. In orchard areas, a dosage of five pounds per acre, repeated several times seasonally, is a common routine for control of the codling moth. Under such circumstances it is not so surprising that birds are killed as it is that fairly high populations seem to survive.

Possibly of more concern to wildlife than DDT is the host of super bug killers now invading the control field. While many of these are special-purpose materials, a few appear adaptable to a variety of insect-control needs and they may eventually vie with DDT in over-all extent of use.

Most of the new compounds are of a greater potency than DDT, and one group, the organic phosphates, includes chemicals 75 to 100 times as toxic. With most of the organic phosphates, ingestion of the material is not necessary for poisoning since they are quite readily absorbed through the skin. An additional hazard centers about the fact that they are volatile and the vapors are highly toxic. Such characteristics probably account for the fact that one of these insecticides, parathion, already has been responsible for the death of six persons engaged in manufacture of the poison or using it for control.

Early reports on another of the group were such as to encourage tests to determine its possible rodenticidal value. In the course of these studies the material was tested as a contact poison by smearing carefully measured quantities on the shaved backs of rats.

The material proved to be so potent that the minimum amount to kill could not be measured in its pure state. Not until the poison was finally diluted down to one part in 40 parts of soybean oil was it found that less than a half drop of this mixture would kill a rat. By a process of reverse mathematics it was determined that *one drop* of the pure chemical would kill 100 rats or 2,500 of the smaller and possibly more susceptible house mice. This toxicant, commonly called TEPP from its full-blown name of *te*tra*e*thyl-*p*yro*p*hospate, is of such a potency that a renowned toxicologist ventured the considered opinion that one drop in the eye would kill a human before it could be washed out.

While toxicity reports for the "super-insecticides" give basis for new apprehensions, it should be realized that these poisons obviously are not employed out-of-doors in their full strength. And in fact their extreme toxicity need not be indicative of their potential effects on wildlife. As highly diluted mixtures, their poisonous level as they are used might be comparable to that of other commonly used insecticides. Also, a characteristic that might appear in their favor is their unstable nature. The fact that many disintegrate rapidly into non-poisonous end-products might make them safer for some field uses than less poisonous but more enduring products such as DDT.

With the trends in insect control leading to chemicals of greater and greater toxicity, it is obvious, however, that redoubled caution will have to be exercised in the use of such poisons out-of-doors. It has been apparent from past operations that some of the most serious wildlife losses from insect control have resulted from plain carelessness. The new super bug killers are of such a potency that any margin of safety will be a narrow one, indeed. And future mistakes are likely to be far more costly than any experienced to date. A primary need, which currently is not being met, is for a careful appraisal of these materials as they are used in productive wildlife environments. If future operations are to be guided in ways considerate of all interests, a fact-finding program to fill this basic need will have to be instituted soon.

A PRICE ON HIS GOLDEN HEAD— *Continued from Page 236*

tering our lands that those resources are there—rodents in particular? What are the migratory habits of the eagle? Are we planning for multiple use—both material and intangible—on our public lands? Are the public servants, federal or state, aware of the multiple interests and rights in our outdoor estate?

We need expert attention to this matter of our sharing with wild creatures a world that up to this time all of us have found good. Call it social study or ecology, with economics thrown in. We need attention to this by people, by institutions, government or otherwise, if we can find them, who have the qualities of compassion and vision in human affairs.

The fact that we have through the centuries recognized the qualities, the living beauty, of a bird sufficiently to engrave its image on the emblems of our sovereignties, places *us* high in the animal kingdom. A species that can produce a Shakespeare, Rembrandt, Beethoven, Gandhi, and Lincoln should not fail to enrich itself by reaching a friendly hand toward another species in difficulty. There is at stake in this particular instance not only the fate of a great bird, but also the human capacity to tolerate, to appreciate, and to enjoy.

NATURE IN THE NEWS— *Continued from Page 225*

topless tree trunks; their feet are tiny and unfit to support them on a perch.

Swifts appear to have no tail and the neck is very short; "a cigar with wings" is an apt description. The rapid strokes of their narrow wings appear to alternate, but the camera unmasks this illusion. The only call is a chippering note, loud and unmusical.

Physically unable to alight and pick up nesting material, a swift flies at a tiny, brittle dead twig on a tree, breaks it off in passing, and carries it to the chosen chimney. Here, using sticky saliva, the inch-long twig is plastered against the brick.

More sticks are added until a narrow, shallow nest is draped against the masonry. It seems inadequate for even a light bird but it serves well. Nesting swifts seem inured somehow to summer pilot lights in gas furnaces.

Food on the Wing

Both the nighthawk and swift eat only insects captured on the wing. This means near-starvation during prolonged rainy periods. However, migration is greatly simplified, since they may feed as they go, with no stop-overs to hunt food, as most birds must make. Nighthawks migrate from northern Canada to Argentina and banded swifts from North America have been shot by Indians in the Amazon valley.

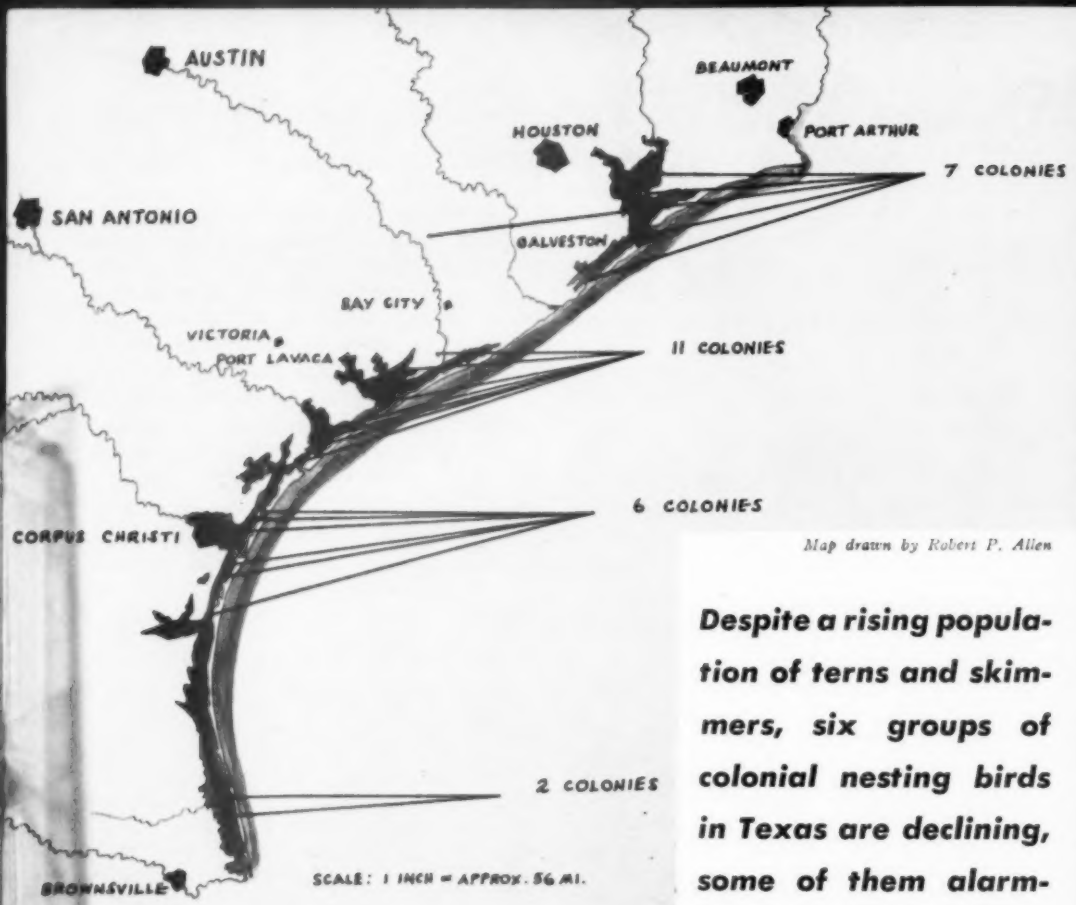
These birds are the prototype of aircraft refueled in flight. To remain airborne, the bird must keep moving rapidly. Many calories are burned and there is only one possible source of replacement. One wonders how many milligrams an hour of gnats and winged ants are required to fuel an ounce of aircraft. But mixing problems of metabolism and aerodynamics is not restful twilight relaxation.

Other species are seen regularly high in the evening sky. Purple martins, the familiar residents of multiple bird houses, are easily recognized as true swallows. In August, the domain of the martins is invaded by those adaptable pests, the starlings, seeking a share of the rich crop of aerial insects. They even imitate the gliding flight of martins but are marked by longer bills and square tails. European rock doves, "pigeons" in America, are offensive on the naturalist's landscape; but, like airplanes, they can only be ignored.

Often, an observer with binoculars will see some unusual species high in the twilight. These are large, shy birds such as the stately herons, and various hawks, which choose to avoid the city by altitude rather than detour. Flocks of any sort are rare in June when bird populations are dispersed for nesting.

Brilliant sunset colors are not the only evening attraction. If one faces east, the great spotlight is placed properly, at the rear of the theater, and the lively actors are seen without glare against the blue backdrop with its drifting clouds of delicate hue.

Just before darkness, the last actors appear on stage. The bats are not birds but furry mammals whose wings are of skin stretched between monstrously overdeveloped arm and finger bones. Silently, they hunt flying insects by ear, rather than sight, as small boys know. A pebble thrown near a hungry bat will be pursued hopefully.



Location of recent Texan bird colonies with relation to major population centers.

Map drawn by Robert P. Allen

Despite a rising population of terns and skimmers, six groups of colonial nesting birds in Texas are declining, some of them alarmingly. Growing industries, pollution, and increasing human populations threaten

Bird Colonies along the Texas Coast

By Robert P. Allen

WHEN a native Texan tells you that everything in his state is big it is generally a good idea to go along with him and agree that he is right. Eight million Texans can't be wrong! In addition to the indisputable fact that Texas is the largest state in land area, it can boast of its big men, big football teams, immense cattle ranches, top cotton production, vast petroleum resources and, particularly since 1939, its spectacular industrial and population growth. In the last decade this giant empire has increased in human population by more than one million souls, over 200,000 of them in the Houston area alone. Corpus Christi has

The population decline of herons, egrets, and spoonbills may reflect the losses of the war years. Photograph of spoonbill by Allan D. Cruickshank.

nearly doubled in the number of its inhabitants during the same period. Both of these rapidly expanding cities are thriving seaports, by virtue of man-made ship channels, and thus are of special interest to us because of our concern for the nesting colonies of herons, egrets, terns, gulls, skimmers, pelicans, roseate spoonbills and other colorful species that are to be found along the sweeping curve of the Texas Gulf Coast. What is happening to these natural beauties of the Lone Star State during this unprecedented boom?

It is exceedingly fortunate that a comprehensive survey of nesting colonies of the Texas Coast was made in the spring and early summer of 1939. Those participating in the counts, at one or more locations, were John H. Baker, Frank Clarkson, James O. Stevenson, Ray Custer, O. F. Hartman, Robert Hopper, J. G. Fuller, Louis E. Rawalt, E. T. Dawson, Albert Nutt, H. C. Blanchard and John O. Larson, each of whom was well acquainted with certain sectors of the coast, besides representing by their cooperation the active interest of the Texas Game, Fish and Oyster Commission, the (then) U. S. Biological Survey and the (then) National Association of Audubon Societies. The writer made the entire route, visiting some areas twice to obtain a more accurate estimate of the nesting populations.

Birds were found nesting in 23 coastal sites, four of these in the general vicinity of Houston, seven in the San Antonio Bay

region, nine close to Corpus Christi and three in the Brownsville region. A total of 23 species were listed in these colonies to the total number of 40,000 nesting adults and perhaps more than twice that many young.

Eleven years later, in the summer of 1950, the writer was able to make exactly similar counts at many of the same locations, with the assistance of Louis E. Rawalt and Charles M. Brookfield in the Corpus Christi area. Portions of the coast not covered by the writer were carefully checked by John O. Larson (Green Island), Mrs. Jack Hagar (Swan Islands), Jake Smothers, (Eagle Lake), Robert Tanner (Colorado River bottoms) and William E. Rheney (Galveston Bay region). In round numbers the results were gratifying in that the number of nesting sites had increased to 26 and the total population of nesting adults to 46,500. Also, data was obtained on 27 nesting species.

Before deciding that a growing human population and an expanding industrial development must be in some miraculous way beneficial to the welfare of herons, terns, pelicans and the other species concerned, it is necessary to examine these figures with some care. While certain groups of birds demonstrated a remarkable ability to adapt themselves to the changes of the previous eleven years, other species and groups unquestionably suffered as a result of some of those same changes. While some birds increased as never before in the 30 years that we have been actively interested in the Texas coastal colonies, others have shown a decline that can evidently be attributed to events of the period 1939-1950.

Before discussing the apparent impact of events on individual groups and species, it will be helpful to mention the nature of some of the major changes that have been taking place on the bustling Texas Coast. In the sense in which the term is applied today the Texas Coast has not always been bustling, in spite of a long and interesting history. Originally occupied by scattered bands of easy-going Karankawas and other aborigines, whose kitchen middens may still be found along isolated shore-lines, the Texas Coast is said to have been first explored by Alvarez de Pineda in 1519. Since that early date it has been governed under six flags, those of France, Spain, Mexico, the Republic of Texas, the Stars and Bars of the Confederacy, and the United States of America. Actual settlements, however, were late in coming, the first Spanish-Americans establishing themselves on the Rio Grande in 1749 and moving towards the present site of Corpus Christi slowly during the next couple of decades. It was not until 1825-28 that Anglo-Americans began to move in, but after those years their numbers increased rapidly. Heavy settlement came much later, however, chiefly after World War I.

In an interesting and valuable paper, *Certain Recent Geological and Biological Changes in South Texas, with Consideration of Probable Causes* (1942), by Dr. W. Armstrong Price of Texas A. and M. and Dr. Gordon Gunter of the University of Texas, the authors discuss the lowering of water tables, silting of estuaries and inner bays, loss of vegetational cover, rapid filling of Laguna Madre by wind-blown sand, steady spread of brush across former prairie, northward and eastward migration of southwestern faunal forms and other significant changes. They conclude "that these changes were brought about by farming, draining, grazing and other influences of the white settlers, coupled with a series of hard droughts in South Texas beginning in the 1880's." It is fairly obvious that none of these events has improved the pristine beauty or potential economic value of the great State of Texas.

More recently there has been a marked dispersal of industrial plants to portions of the Texas Coast where a few years ago one heard only the bawling of white-faced steers or the occasional buzz of an irritated rattlesnake. With these industries have come mushrooming settlements of people to work in the plants. It was astonishing to drive to what had been, before the war, a brush-grown rendezvous of white-necked ravens, and find the ravens gone and the brush replaced by the sleek, sprawling, efficiently designed buildings of a modern industrial

An increase of ibises may be a population shift. Disturbed at their inland rookeries, many have moved to the coast. Photograph of glossy ibis by Allan D. Cruickshank.

plant. There are many such examples and while we rejoice with the progressive citizens of Texas at these signs of growth and maturity, we still hope that in the immensity of their great state there will always be plenty of room for bluebonnets, bawling steers and birds. No doubt there will be, for the average Texan is an outdoorsman, avidly in favor of all things Texan, including wildlife.

Still other recent changes provide real cause for concern, and if some of the more spectacular birds of the Texas Coast are to survive, the people will have to provide them with certain safeguards. More than a year ago the Intracoastal Waterway was completed, linking Louisiana with Brownsville and providing a dredged channel for oil barges and other light-draft traffic along the entire Texas Coast. While this canal has made it possible to reach otherwise inaccessible portions of the coast, thus removing forever the comparative isolation enjoyed by certain coastal areas, and although the disturbance brought about by the puffing tugs, lines of barges and other boats, and the possibility of oil pollution, is not on the face of it anything but detrimental to wildlife interests, it is a startling paradox that the construction of this waterway has been of tremendous benefit to certain groups of coastal birds, notably the terns and skimmers.

With the growth of industries, chiefly since 1939, there has been an increased tendency for pollution of coastal waters from careless oil field practices upstream, not to mention indifferent disposal of wastes from coastwise plants. This sort of destruction of public property, in the form of fish and other marine animals of great value as both food and sport, can only be stopped by the repeated and overwhelming expression of public opinion. Indirectly, pollution is also destructive to the coastal birdlife that has great potential value as a tourist attraction, in addition to its normal place as one of the natural beauties of the Texas littoral.

The increase in human populations, particularly close to or directly on the coast, poses yet another problem, much emphasized since 1939, and especially since the close of World War II. People who work in industries these days have higher wages and more leisure time than formerly. In a part of the country with the peculiar advantages of coastal Texas, a great many families enjoy various forms of outdoor recreation, particularly boating and, above all, fishing. As a result, more people are getting out along the Texas Coast in small boats today than at any time in its long history. Coupled with this we have such factors as the modern outboard motor and the increased mileage that is made possible by recently built canals and boat channels. All of these facts, when brought together, spell potential trouble for colonies of birds that nest in exposed sites close to centers of a growing population. Except for a barren stretch of coast between Baffin Bay and the Arroyo Colorado, above the Brownsville region, there are today few spots on the coast of Texas that are not relatively close to some expanding center of human activity.

In spite of this, it is most interesting that the number of nesting colonies, nesting species and total number of nesting adults seems to have increased on the Texas Coast during the very decade that has seen the greatest expansion of so many potentially harmful influences.

The redistribution of the relative number of colonies in the four major coastal regions compares as follows:

Region	Number of Colonies 1939	Number of Colonies 1950
Houston	4	7
San Antonio Bay	7	11
Corpus Christi	9	6
Brownsville	3	2
	23	26

There is an increase in the number of colonies in the Houston region in spite of the astounding growth of that metropolis. There were no deserted sites, although a report on the Katy bird colony was not received. Large, even spectacular, gains were made as a result of the dredging of a canal and the consequent creation of spoil banks along the east side of Trinity Bay, from Smith Point northward. However, these are listed simply as one major site, whereas the number of birds added is con-

siderable. In addition there are three new colony locations in West Bay near Galveston that are included in this general region. One of these is a spoil bank. Three old standbys—the Vingt'un Islands, West Bay Bird Island and Eagle Lake—continue unhampered by the industrial progress of the region as a whole. It should be pointed out that the first and last named are carefully protected sites, thanks to the Houston Outdoor Nature Club, the Eagle Lake Club and the National Audubon Society. The new spoil banks in eastern Trinity Bay also had some protection from the Audubon warden at Vingt'un.

The brown pelican faces an uncertain future. Photograph by Allan D. Cruickshank.

The San Antonio Bay region, most isolated of the four areas under consideration, lost three old sites, retained four and gained eight new ones since 1939. Three of the new sites are on spoil banks.

The Corpus Christi region, where the population pressure has been, perhaps, most telling, shows a regrettable loss of six old colonies, while the three that have resisted change have been reinforced by the addition of three entirely new colonies, all of them on spoil bank sites.

With two minor colonies unreported on, the only significant shift of bird populations in the Brownsville region has been the addition of a spoil area close to the Waterway.

There are 20 deserted nesting sites on record since 1934, when such information begins. Thus, the complete record covers a period of 16 years and the *average* loss is 1.25 colonies each year. In the period with which we are chiefly concerned—the 11-year span from 1939 to 1950—there were 14 deserted sites, or only slightly more than the average for the entire period of record.

It is usually difficult to be certain as to causes of desertion. However, with four of these deserted sites we can be reasonably sure that the proximity of the new Intracoastal Waterway and the disposition of spoil moved the nesting birds. Five other sites in the populous Corpus Christi region seem to have succumbed to frequent disturbance by human visitors. More than once, people were reported playing ball with the eggs of egrets and pelicans whose potential value to the community as a tourist attraction is enormous.

It is important, of course, that 10 key bird colonies have remained undisturbed throughout this entire period. In addition,

Continued on Page 270

[In this and succeeding issues we bring you a test of your ability to identify birds from photographs.]

PHOTO Quiz

By Hugo H. Schroder

All photographs by the author.

The author, a well-known bird photographer, asks about each picture, "What bird is it?"

A long-necked, gray bird, about the size of a great blue heron; it is distinguished from a heron in flight by the jerky motions of its wings and its outstretched neck.

↑ Our smallest "horned" or "eared" owl.

FOR ANSWERS TO PHOTO QUIZ
SEE PAGE 267

→ A noisy bird, like all of its kind, it has wings and a tail of solid blue, but no crest.

Although birds in our backyards may live successfully without us, they are quick to accept our help. If you want to learn how practical they may be, try

Helping the Birds at Nesting Time

By John K. Terres

House wren struggling to put a large twig in its nest box. Photograph by W. Bryant Tyrrell.

The more I watch birds, the more some of them astonish me with their adaptability. In human beings we might describe this as a practical quality through which certain people always "make the best of things." In the same way, our house wrens, even if our backyard was completely bare of plants, would probably pick up nails, pins, wires, or any other odds and ends with which to build their nests, as a pair did that nested in a yard in Ames, Iowa, a few years ago. I am sure they would use almost any kind of material they could find, provided we put up nesting boxes for them. Fortunately, we have trees, shrubs, and a lawn, and from these the wrens gather the coarse dead twigs and dried grasses they ordinarily use to build their nests.

When our house wrens start to build, we often pick dead twigs from our spirea and dogwood bushes and put them in neat little piles on the lawn. The sharp-eyed wrens soon find them and carry them hastily into the nest box, as if they feared that some other bird might find this treasure and make off with it before they did.

Once, to see if they always preferred dry, dead twigs, we mixed in a few fresh green ones from which we had stripped the leaves. One of the wrens immediately picked these out of the pile,

* A chapter from the bird-attracting book, "Songbirds in Your Garden," by John K. Terres, to be published soon by the Thomas Y. Crowell Company, New York City, N. Y.

one at a time, flew to a corner of the yard, and dropped them. Then both birds went to work on the remaining dead twigs and quickly carried them into the nest box. Apparently they rejected the green twigs because a nest built of these might make the inside of the nest box damp. Such is the guiding instinct of birds, which almost invariably tells them the correct thing to do.

We have a pair of Baltimore orioles that nest either in our suburban New York City yard, or in our neighbor's yard, every year. They don't find on our properties the milkweed plants from which they usually gather long fibers to weave into their nests. Instead of going on a long hunt for these materials they have learned to accept bits of string, cotton yarn, and strips of cloth that we put out for them. The instincts of these adaptable birds have told them that our gifts are acceptable substitutes.

A Bird Tragedy

One spring, when I first started to experiment with the willingness of birds to accept man-made nest materials, I was living on a farm in upstate New York. A pair of Baltimore orioles were building a nest in the drooping end-branches of an elm tree in my front yard. Each morning, I put out strings, finely torn strips of rags, and cotton waste on the lawn for them, and by noon, the orioles had taken every bit of it to their growing nest. By the time they had completed it, they had used about 75 feet of white string, which I had cut into 12-inch lengths for them.

Then came the tragedy. One afternoon I looked up in the tree and saw the bright yellow and black body of the male bird hanging limply from the side of the nest. With an extension ladder I reached him and found that he had gotten his neck entangled in one of the strings. The string, like all those I had cut for the orioles, was so long that it had not been completely woven into the nest. A loop in it had trapped the bird. He was dead—strangled to death by one of my good intentions.

I had heard of orioles, robins, chipping sparrows, swallows, and other birds dying from getting enmeshed in horsehairs, plant fibers, and other natural nesting materials, but I never quite understood how, until I saw the treacherous loops in those long strings. Since then I never put out string, yarn, flax, thread, horsehairs, or strips of cloth any longer than about six to eight inches. As far as I know, none of the birds using them has been injured by being caught in them.

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How to Offer Nesting Material to Birds

One hot July morning a few years ago, we cut short pieces of white and dark-colored yarns and simply dropped them on the grass in the center of our lawn. A female robin, building her second nest for her second brood that summer, quickly discovered the pieces and carried them away as fast as we put them out for her. The next day, we dropped short pieces of cotton twine on the lawn and watched her carry these to her nest.

Because it is safer for birds, we ordinarily hang nesting materials on the limbs of trees and shrubbery. Here, robins, orioles, and vireos can pick these up without being stalked, and perhaps caught, by cats which might sneak up on them while the birds were absorbed in gathering nest materials from the ground.

Some of our friends who attract birds prefer to put the string-like materials in a small wire basket, hung from the branch of a tree, or to nail a wooden container to a tree trunk and fill it with nesting material. Later, the wire basket and wooden container can be used to hold suet for birds in winter.

We have taken the mesh-bags that oranges are sold in, and have filled these with yarn, strips of cloth, horsehairs from old upholstery, bristles from worn-out paint brushes, cotton batting, pieces of wool, non-absorbent cotton, chicken feathers, pieces of soft cloth, rags, paper, bits of fur, excelsior, and dried grasses. We have watched robins, orioles, yellow warblers, chipping sparrows, song sparrows, goldfinches, cedar waxwings, and other birds come to the bag to make their own choice of nest materials from this hodge-podge.

We try to keep these bags, or other containers, filled with nest materials available to birds from May through August. Some birds, like the robin, may build two or possibly three nests during the summer. Others—goldfinches and cedar waxwings—do not nest until late summer, usually in July and August. Certain other birds require even different nest materials, which we also offer them.

Mud for Birds

One of the queerest robin nests that I ever heard of was built in a tree in a Boston backyard in the early 1900's. The female robin usually builds most of the nest, and the male helps by bringing her materials. This female, with an extraordinarily feminine touch, had woven into her nest two red satin ribbons worn by people who attended the 1903 convention of the National Education Association. Trailing partway out the side of the nest, the gold-lettering on one of these ribbons read plainly:

"New York N. E. A. at Boston, 1903."

Near the nest rim, the bird had imbedded a piece of coarse white lace through which she had neatly threaded two white chicken feathers. The remainder of the nest she had decorated with brown string, yellow string, a piece of blue embroidered silk, the hem of a handkerchief, and a bit of white satin ribbon! But inside the nest, she had unfailingly built a hidden lining of mud. Without mud, no robin nest is complete.

Wood thrushes, phoebes, barn swallows, and cliff swallows are other birds that use mud in building their nests. In one corner of our garden, near where we grow tomatoes, parsley, and other vegetables, we have sunk an old cake pan.

Barn swallows often line their nests with feathers. Photograph by Hal H. Harrison.

about 2 inches deep, in the ground. In it, each spring, we put a mixture of clay and garden soil. To this we add enough water to make it wet and sticky. When it is about the consistency of wet putty or modeling clay, we know it is about right for the birds. Robins come to the pan regularly while they are nest-building. They stand over the wet mud, peck down into it vigorously until they get a beakful, then fly off with it to the nest. There the female molds the mud into an inner, cup-shaped lining by settling down in the nest and turning her body around and around. During fair weather, soaking our "mud pan" with water each day seems to keep the material sufficiently moist to suit the birds.

Mud is so important to some birds in nest-building, particularly to cliff and barn swallows, that it may be impossible for a colony to remain established without a dependable supply. A man who encouraged a great cliff swallow colony to nest on his barn in Wisconsin kept large pools of water and mud near the barn all during the nesting season. Starting in 1904 with one nesting pair, by 1942 he had more than 4,000 cliff swallows nesting on the sides of his barn. He claimed that the swallows could not have built up to a 2,000 nest colony without this large and reliable mud supply.

Feathers for Swallows

One spring morning, a woman in a New Hampshire farmhouse sat at an upstairs window looking out over the sunlit fields. She had been very ill all winter and her recovery had been discouragingly slow. As she looked gloomily down into the farmyard, a breeze picked up a white chicken feather and whirled it into the air. Higher and higher it hoisted the feather until it had lifted it to the height of the woman's window. There the feather floated motionless, but only for a second. Suddenly an arrow-shaped, steel-blue form struck it, darted toward the ground, rebounded high into the air, and with the feather in its beak raced toward the barn 100 yards away.

The woman gasped with admiration. A barn swallow had snapped the feather out of the air, and without a pause had flown swiftly with it to the barn and through the open doors. Somewhere within, on one of the big cross-beams, it had taken the feather to its mud nest. There it would add it to the soft lining of feathers and grass that would cradle the eggs, and later, the young ones.

The woman called her husband and excitedly told him the story. She asked him to bring her feathers—lots of soft, fluffy feathers—from the chicken yard. Her husband knew that barn swallows seemed to prefer white feathers and so he gathered only white ones. When he returned with a small sack filled with them, the woman leaned from the open window and dropped one on the air. A breeze caught it, sped it upward and outward. A pair of swallows came racing from the barn, one caught the feather and turned deftly to carry it to the nest. The

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other bird, chippering excitedly, raced alongside its mate and both birds disappeared inside the barn.

Again the woman dropped a feather on the air and this time, *two* pairs of swallows came swiftly from the barn in a race to catch the feather. Within a week, nine pairs of barn swallows were taking the feathers that the woman dropped out of the window for them each day. Several of the swallows became so tame that they snatched the feathers from her fingers as they flew past her window.

One morning, she arrived at the window 15 minutes later than usual. When she looked out she was astonished to see the barn swallows flying back and forth, calling in a way that she took to be a loud demand for more feathers! When she tossed one into the air, they all dived for it at once.

For three weeks the swallows came for the feathers, until the end of May, when their nest-building seemed to be over. To the woman this had been a new experience with birds—one that had helped her regain her strength and had speeded her recovery. She vowed never to forget the swallows and said that, thereafter, they would never want for white feathers at nesting time and that her barn doors would never be closed to them. They never were, as long as she lived.

WHY NOT TRY CLOSE-UP PHOTOGRAPHY?—*Continued from Page 247*

diopters, a word we can forget, unless you want to get into a discussion of optics. All you have to remember is that the higher the diopter value, the greater the shortening effect of the lens. At present you can purchase portra lenses of 1 plus, 2 plus, 3 plus, and 10 plus diopters. You can use several in combination, placing the higher valued portra lens next to your camera lens, and they simply add their effect (a 2 plus and a 3 plus in combination would give you a 5 plus diopter effect). If you want a lens of a specific intermediate value, an optician can grind one for you from a spectacle blank.

The advantage of using portra lenses instead of extension tubes whenever possible is that they come in the same sizes as filters and are simply placed into adapter rings and slipped quickly over your camera lens, obviating the necessity of relatively time-consuming insertion of extension tubes (you may, of course, use extension tubes and portra lenses at the same time for greater close-up effect). Another great advantage of portra lenses is the fact that no exposure correction is necessary when they are used.

With cameras having removable lenses, tremendous close-ups may be obtained by using lenses of shorter focal length than the standard lens of the camera. A 4 x 5 Graflex, for example, that normally has a 7½ inch focal length lens, can give negative images many times the normal size of the object being photographed if, let us say, a 2 inch lens is used. If you use a 1 inch lens from your movie camera, your effect would be almost photo-micrographic. Of course the shorter focal length lenses have to be placed into lensboards or adapters of some kind to enable their use with the camera.

When using lenses of short focal length you will be restricted to close-up work because, unless using a press type camera, you will not be able to bring the lenses close enough to the film to enable an object any distance from the camera to be brought into focus.

One very disturbing phenomenon encountered when working with close-ups is the fact that the closer you get to an object the smaller the depth of focus becomes (depth of focus is the distance of clear focus). The only way you can compensate for this is by reducing the size of the diaphragm opening. Since reduction of the diaphragm opening decreases the amount of light entering the camera, the exposure time must be longer to compensate for this and permit normal film exposure. Longer exposures, the closer you get to the object, must therefore be made, a fact which ordinarily permits extreme close-ups of non-moving objects only. Even with the smallest diaphragm opening possible, depth of focus, when doing really close-up work, is only a small fraction of an inch (if, for example, you were using a 10 plus diopter

portra lens, you would find your depth of focus, if using a diaphragm opening of f/16 would be only about ¼ inch).

The best kind of camera for close-up work is the single-lens reflex type because of its ability to sight and photograph through the same lens. Regardless of how close to an object the camera is brought, the lines of sighting and photographing are identical. Press cameras or other cameras with ground-glass focusing also permit this utilization of one lens system for all procedures.

Cameras that have the sighting and photographing lens systems separate, like the twin-lens reflex cameras, run into a problem called parallax. Parallax is the inability of the two lens systems to cover identical fields. Parallax increases as the camera gets closer to the object being photographed, until a point is reached where the sighting and taking systems cover different fields entirely. There are parallax correctors on the market, but they are available only for twin-lens reflex type cameras, and are effective only to a point approximately nine inches from the lens, a condition which does not permit real close-up work.

Attachments are available for some cameras (Leica, Contax, Clarus, etc.) that permit focusing on a ground glass with the camera lens, and then, by sliding or hinged arrangement, photographing the object as it was focused. The disadvantage of this method is that it requires a tripod set-up. Actually, the only kind of camera that can be used for extreme close-up work without a tripod is the single-lens reflex type unless a focal frame is used.

A focal frame is a frame made of wire or other material that is fastened firmly to the camera. It extends around the object being photographed at the plane of focus. Use of a close-up frame has many limitations, but is the only method that can be used if a camera such as the Kodak 35, Bolsey, etc., which have a parallax problem, are used without a tripod for close-up work. Readers interested in this type of equipment are referred to the Eastman Kodak Company, leaflet 3-47 CH, entitled *Portra Lenses and a Technique for Extreme Close-Ups.*

So, if you want to try close-up work, look over your camera and see what you'll need to adapt it for this type of photography. You'll get a great thrill the first time you see a flower, insect, or other object filling the entire screen or print area.

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BOOK NOTES

By Monica de la Salle

FLAMINGO HUNT

By Paul A. Zahl, Bobbs-Merrill Company, New York, 1952. 8½ x 6 in., 270 pp. Illus. by Fritz Kredel. $3.50.

"Exciting reading" is the best description of Dr. Zahl's adventures while searching for nesting flamingos in the Bahamas between 1946 and 1949. Dr. Zahl is a Research Associate of the Conservation Department at the American Museum of Natural History and his mission, successfully accomplished, has advanced knowledge of the roseate birds which is so much needed to help protect this threatened species. Written with humor and zest "Flamingo Hunt" is as much a book on life in remote islands of the West Indies as on observations of rare and little-known birds.

WILD FLOWERS FOR YOUR GARDEN

By Helen S. Hull, M. Barrows & Company, New York, 1952. 8½ x 6 in., 280 pp. Drawings by Alexander Seidel, photography by Roche. Indexed. $4.95.

How many times have we walked through woods and meadows enchanted by the natural arrangement of colors and blending of fragrances? How often also have we given the pretext of high cost and hard work to give up a flower garden? There is no excuse for this really, because with a little imagination, ingenuity and the help of Mrs. Hull's refreshing guide book, it is possible to grow wildflowers in a backyard, on a hillside, near a brook or elsewhere—anywhere in the United States. Sections are devoted to how and where to plant wildflowers, where to find them and how to transplant them. A hundred pages illustrate and describe wildflower gardens in every state. A bibliography, a list of supply houses for seeds and plants, a glossary, an index, black-and-white drawings, lovely color photographs, and a text both factual and enthusiastic should be warmly

welcomed by beginners and experienced gardeners. Mrs. Hull is a former president of the National Council of State Garden Clubs.

THE DESERT YEAR

By Joseph Wood Krutch, William Sloane Associates, Inc., New York, 1952. 8½ x 5¾ in., 270 pp. $3.75.

When we think of a desert, the words forsaken, barren, dry and lifeless come to mind. However, "many of us are so constituted that we never use our eyes until we are on foreign land. It is as though a Cook's ticket performed an operation for cataract." Mr. Krutch has the gift of seeing and relating what he observes. Not only does the desert become alive, but the changing of the seasons and the elements that make them up are described with the curiosity and humility of one wishing to learn about and understand the unknown. The author of "The Twelve Seasons" and "Henry David Thoreau" has written a highly readable book combining wisdom and simplicity with literary skill.

THE GARDENER'S TROUBLE SHOOTER

By Victor H. Ries, Sheridan House, New York, 1952. 8¾ x 5¾ in., 320 pp. Indexed. $3.50.

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what it should be, nor are the weather, the sun, or the shade, let alone weeds and bugs. Professor Ries has been acting as a confessor to the unfortunate horde of worried gardeners for the past 23 years and has written a practical book of advice on how to keep plants healthy and gardeners happy. Black-and-white drawings illustrate an informative text, as well as a few good cartoons.

A GLANCE BACKWARD—*Continued from Page 219*

herons returned to southern New Jersey to breed again, possibly for the first time in 50 years.

In the late 1930's and throughout the 1940's, the National Audubon Society greatly enlarged its sanctuary program in the Gulf States, with wardens constantly on the job in bird rookeries. This increased protection soon showed remarkable results.

In 1939, Dr. Thomas S. Roberts of the Minnesota Museum of Natural History received a positive record of the American egret breeding in Wisconsin for the first time in that state during this century, and in southern New Jersey, snowy egrets nested there for the first time in 67 years.

A year later, a pair of little blue herons nested at Marshfield, Massachusetts, and in 1941, American egrets were nesting in Illinois and Iowa.

Meanwhile, Julian K. Potter reporting in *Audubon Field Notes*, September-October, 1942, said that in southern New Jersey the largest of several American egret colonies "now contains about 150 breeding and roosting birds." In 1946, American egrets nested in Ohio for one of the first breeding records for the bird in that state.

Many of our readers will remember 1948 as the "great year" for southern herons. In Minnesota, American egrets nested for the first record in history for the state, and in southern New Jersey, American and snowy egrets, and little blue herons doubled their breeding populations in 1948, over 1947.

Ludlow Griscom, reporting in *Audubon Field Notes*, September, 1948, said that egrets and white herons (immature little blues) had been seen in almost every part of New England to the Canadian border by July 31 of that year: "The American egret (in flocks up to 175) predominated inland in New England, and arrived first; about two weeks later, the little blue, in large numbers, appeared on the coast and locally outnumbered the American egret."

Metropolitan and rural newspapers carried stories of the appearance of hundreds of these "wonderful white birds" in the marshes near large eastern cities and along streams and ponds of the open country. The *London* (England) *Times* in an editorial, *"The Egret Returns,"* retold the story of the National Audubon Society's 50 year fight to save these American birds.

In 1949, the year following the great southern heron flight into our northern states, a pair of snowy egrets nested on Long Island, New York, for the first time in 75 years.

In 1951, Harold Mayfield, in the October issue of *Audubon Field Notes*, wrote:

"The dramatic recovery of the American egret is a major event of our generation. Probably there are more nesting in this region now (Ohio, Indiana, Illinois, Iowa, Kentucky and Missouri) than at any previous time in history . . . Old colonies get larger and new ones are found every year . . ."

Up until the summer of 1951, southern herons had not made a great midsummer flight into the northern states and Canada comparable to that of 1948, but the northward advance of the spring breeding colonies continues. We hope they will keep spreading and will not be limited by food or nesting sites for many, many, years to come.—John K. Terres

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BIRD COLONIES ALONG THE TEXAS COAST—*Continued from Page 259*

the gains of new colonies have more than offset the losses, at least in the over-all period since 1939, there being 16 new colonies against the 14 that were deserted. It is also of importance that six of the 10 key colonies have had the advantage of special warden protection, while at least two of the remaining four have had occasional or partial protection.

Probably some of the deserted colonies might have been saved if warden protection had been provided. One might well think that, since the total number of nesting adults of all species has increased, the birds from deserted sites must have simply moved elsewhere and resumed their nesting cycles with marked success. This is not true, as will be seen by analyzing the loss and gain

column of species and groups.

For convenience, most of the following totals are given in round numbers. Figures are based almost entirely on nest counts and represent the number of nesting adults.

	1939	1950	Loss or Gain
Herons and Egrets	24,700	18,300	— 25 per cent
Terns and Skimmers	3,500	14,900	+ 76 " "
Laughing Gull	10,000	9,400	— 6 " "
White Ibis	60	1,700	+ 96 " "
Brown Pelican	1,000	760	— 24 " "
Roseate Spoonbill	844	526	— 37 " "
Glossy Ibis	14	590	+ 97 " "
White Pelican	0	400	+100 " "
Oyster-catcher	20	9	— 55 " "
Olivaceous Cormorant	18	0	—100 " "

Of the four groupings that show an increase, only the gain of the tern and skimmer group is really significant. The most spectacular spurt is for gull-billed and Forster's terns and black skimmers on the Anahuac spoil banks in eastern Trinity Bay. The gull-bill has made the greatest comeback since the days of its wholesale slaughter by plumage trade gunners along the Atlantic seaboard in the 1880's.

The two ibises have simply moved to the coast from inland sites, in our opinion, probably as a result of repeated disturbance. The white pelican is actually decreasing on the Texas Coast as a breeding species, in spite of the above data.

Six groups show a decrease, that of the brown pelican being the most serious, especially so considering its long and pathetic struggle against prejudice on this coast. The drop in numbers of herons, egrets and spoonbills probably reflects to some extent losses suffered during the war years, although a 30 per cent drop in the reddish egret population on Green Island, where warden protection has been constant, may have resulted from normal adjustments, cyclic influences, or other factors beyond our control. There was an interesting lack of immature birds noted in 1950, and this lack was seen among spoonbill flocks as well. Unusually heavy losses in immature flocks may have occurred.

The laughing gull can be said to have continued to hold its own, despite a 6 per cent decrease. The case of the oyster-catcher and cormorant is doubtless similar and concerned with "edge" or periphery of range.

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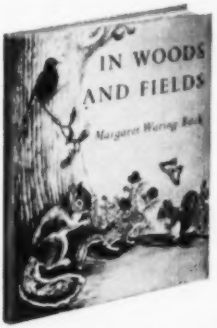

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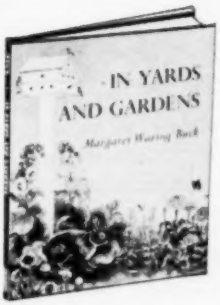

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However, the oyster-catcher is too scattered in its nesting habits to be protected by anything except public favor and education has not yet convinced a majority of the population, on this coast at least, of the incredible beauty and appeal of these handsome birds.

In summary, it can be said that the apparent increase in number of colonies and nesting adults on the Texas Coast during the period 1939-1950 has been largely in the tern and skimmer group, benefiting from the creation of new spoil banks, and the ibises moving coastward under adverse pressure. Other species show a loss.

The natural sites for terns and skimmers on the Texas Coast are low and unprotected and frequently washed by storm tides. Spoil areas average as much as five or six feet or more above normal tide marks. If the future of the terns and skimmers is to be assured there must be agreements worked out with the U. S. Engineers and others who maintain dredged channels and deposit spoil, as well as a continued educational program to assure the sympathy and cooperation of the public, especially among those who find recreation or livelihood through sport or commercial fishing.

Other species, particularly the highly decorative herons, egrets, spoonbills and pelicans, face an uncertain future. The National Audubon Society continues to employ special wardens at four key spots and posts and patrols additional areas. Two of the key spots are under legislative lease to the Society until 1973; others under short term grazing leases from the State. All should be permanently established as wildlife sanctuaries free of encroachment, whether under State, County, Municipal or Audubon management.

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